Sampling and Analysis Plan for Dominguez Channel Oil Spill

Dominguez Channel Oil Spill

Wilmington, California

Prepared for:
Crimson Pipeline L.P.
2459 Redondo Avenue
Signal Hill, California 90755

Prepared by:
Beacon Energy Services, Inc.
2685 Temple Avenue
Signal Hill, CA 90755

WGR Southwest Inc.
11021 Winners Circle Suite 101
Los Alamitos, CA 90720

Stantec Consulting Corporation
25864-F Business Center Dr.
Redlands, CA 92374

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1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) is intended to document the procedural and analytical requirements for the investigation of the Crimson Pipeline crude oil release that resulted from a crude oil discharge from Crimson Pipeline's 4-inch pipeline the "Youngstown Lateral," which connects to the THUMS 8-inch pipeline and crosses the Alameda Corridor Transportation Agency (ACTA) railroad right-of-way (ROW) north of Pacific Coast Highway (PCH) in Wilmington, California. This SAP covers the Youngstown Lateral release area and includes the French drain system of the ACTA ROW; portions of the Shell Lubes Plant south of the oil pipeline release; and continuing to the storm water collection and treatment system located near the intersection of Leeds Avenue and Grant Street.

This SAP was prepared by Crimson Pipeline (Crimson), as required by the U.S. Environmental Protection Agency, Region IX (EPA) *Order for Removal, Mitigation or Prevention of a Substantial Threat of Oil Discharge,* EPA docket number CWA 311-9-2011-0002, Section VI, No. 14. The SAP combines the basic elements of a Quality Assurance Project Plan (QAPP) and a Field Sampling Plan (FSP). The following subsections in this introduction provide the site name and location, responsible agencies, and project organization.

1.1 SITE NAME OR SAMPLING AREA

The project name is the "**Dominguez Channel Oil Spill**" (hereafter referenced as the "Site"). Crude oil from the pipeline release was discharged into the a drain system associated with the Alameda Corridor rail system as described in the Project Plan and the City of Los Angeles storm water management system.

1.2 SITE OR SAMPLING AREA LOCATION

The Site includes the area of the ACTA ROW and adjacent properties near Wilmington, California. The area extends southward approximately 3,000 feet along the ROW from the Youngstown Lateral pipeline location at the intersection of Leeds Avenue and Grant Street at the southern end of the area.

1.3 RESPONSIBLE ENTITY

Crimson is conducting the investigation in response to a release of crude from the Youngstown Lateral pipeline. A review of data collected to-date by ACTA and EPA indicates that crude oil is likely to be found along the French drain system that runs parallel to the railroad system from the release point south to the Leeds Avenue and Grant Street location. In particular, blockages within the drain system coincide with the surfacing of oil in the vicinity of the Shell Lubes Plant, located south of PCH. The intent of the investigation is to determine if crude oil has collected in this area, to assess the impacts of crude oil to the underlying soils, and to quantify the concentration of oil present in these soils. Organizations conducting the investigation and sampling operations under this SAP include Beacon Energy Services, Inc., WGR Southwest Inc., and Stantec Consulting Corporation. All three firms are experienced in environmental investigations across a wide range of disciplines including oil spill response, geologic/hydrogeologic investigations, and remediation with multiple offices located throughout Southern California. All field activities will be conducted under the supervision of a profession engineer or geologist.

1.4 PROJECT ORGANIZATION

The project organization is outlined in the Dominguez Channel Oil Spill Project Plan. Titles/responsibilities, names, and contact information for the agencies, Crimson, their consultants and contractors are listed in Table 1.

TABLE 1
Key Project Personnel

Title/Responsibility	Contractors	Name	Phone Numbers	
			Office	*Cell*
EPA Project Manager (OSC)	--	Jason Musante		213-479-2120
Crimson Pipeline VP/Project Coordinator	Crimson Pipeline Management Company	Larry Alexander	562-595-9216	949-922-9895
Project Consultant	Beacon Energy Inc.	Mark Reese P. G.	562-997-3087	714-624-5301
California Department of Fish & Game (OSPR) Lieutenant	--	Anastasia Norris	310 310 9917	310 310 9917
Waste Management Supervisor	WGR Southwest Inc.	Bill Senner	562-799-8510	310-629-5260
Removal Coordinator	WGR Southwest Inc.	Graydon Martz P.G.	562-799-8510	310-629-5261
Project Engineers	Stantec Consulting Corp.	Kevin K. Miskin, P.E.	909-335-6116	909-224-3406
Investigation Coordinator	Stantec Consulting Corp.	Jim DeWoody	909-335-6116	951-403-4623
Quality Assurance Officer (QAO)	Stantec Consulting Corp.	James Kerr, P.G.	970-879-3250	303-884-7125
Laboratory QA Officer	Test America Laboratory	Lena Davidkova	949-261-1022	--
Environmental Compliance GIS Drafter	Beacon Energy Inc.	Valerie Muller	562-997-3087	310-809-3918

1.5 STATEMENT OF SPECIFIC PROBLEM

Oil was also observed migrating from the ACTA railroad ROW onto the Shell Lubes Plant in December 2010. The discharged oil migrated with storm water into the Shell Lubes facility storm water retention basin. Subsequent investigations determined that the oil was released from the Youngstown Lateral pipeline into the French drain system along the ACTA railroad. Oily storm water backed up at a blockage in the French drain system and migrated into the adjacent Shell Lubes storm water collection system, while some oily storm water migrated through the French drain system southward and discharged to surface storm water system near Opps Street.

This SAP will be used to evaluate the lateral and vertical extent of oil released from the Youngstown Lateral pipeline and into underlying soil or structural fill material along the ACTA railroad ROW and adjoining properties, as necessary.

1.6 DATA USES

Data collected during the field activities will be used to: 1) assess the nature and practical extent (vertical and lateral limits) of crude oil impact in affected areas; and 2) to evaluate the scope of any remedial actions.

2.0 BACKGROUND

On December 21, 2010, oil was discovered in a storm water lift station owned by the City of Los Angeles. The lift station is part of a storm water drain system and is located south of the Grant Street\Leeds Avenue location. Storm water from this station discharges into the Dominguez Channel. The oil entered the storm water system (French drain) from an outfall of the ACTA railroad ROW storm water drainage system.

2.1 SITE OR SAMPLING AREA DESCRIPTION

The site is located north of the Dominguez Channel, east of South Alameda Street, west of Terminal Island Freeway, and south of PCH within the city of Wilmington, Los Angeles County, California (Figure 1). The site is located at Latitude: 33.7825010, Longitude: -118.2372450. Additional figures presenting the different areas of the site are included in the Project Plan and incorporated in this SAP by reference.

The Site or sampling area occupies approximately 3,000 feet of ACTA ROW, which is approximately 100 feet wide, for a total of 300,000 square feet in an industrial area. The site or sampling area is bordered roughly on the north by Alameda Street, on the west by ACTA ROW, on the south by the Grant/Leeds Avenue location, and on the east by ACTA ROW. The specific location of the Site or sampling area is shown on Figure 2.

2.2 OPERATIONAL HISTORY

Land use in the surrounding area is industrial, with petroleum refineries, transmodal shipping, and petroleum distribution facilities. Owners of adjacent properties include the City of Los Angeles, Shell Lubricants (Shell), the Port of Los Angeles (POLA), and private owners. Shell operates the Los Angeles Lubes Plant, located at 1926 East Pacific Coast Highway. ACTA operates the railroad ROW that runs through the ports of Long Beach and Los Angeles, primarily along and adjacent to Alameda Street (EPA Dominguez Channel Spill website).

As described above, the area is industrial and has been for many years. Although the past and present waste management practices of the various industrial facilities are not know at this time, there is the potential for other historical releases and/or spills to have impacted the Site study area.

2.3 PREVIOUS INVESTIGATIONS/REGULATORY INVOLVEMENT

In response to the release, EPA and ACTA performed a number of activities designed to capture and contain crude oil along the ROW. The historical activities are described in the Project Plan. Crimson has not validated the work performed, effectiveness, or completeness of those activities. Samples of impacted media have been collected and analyzed. These data are summarized in Tables 2-1 to 2-3.

2.3.1 Video Taping 8-inch Track French Drain System in the Texaco Slot Area

In the first and second week of January, National Plant Services (an EPA contractor) inspected a portion of the 8-in French drain system starting at the manholes located about 120-ft south of PCH and proceeding north in both the west and east side track drains. The inspection was performed by inserting a remote controlled robotic crawler camera into the drains and viewing the results on a monitor. The inspection was videotaped for future reference. The inspection of the west drain concluded at the cleanout located at Station 978+70 due to a blockage (Figure 4 of Project Plan) and in the east drain at Station 976+40 due to the loss of traction by the robotic crawler. The blockage on the west side drain appears to have been caused by ballast entering through a damaged cleanout into the track drain. The loss of traction on the east side drain was caused by a thick layer of oil in the bottom of the French drain system. ACTA proposed to continue the inspection of the French drain system starting at the same manholes located about 120 feet south of PCH (Station 983+30) and working south. National Plant Services was contracted to perform these activities. Additional inspections were performed at the following locations:

Section A = West side proceeding north and south, between manholes at Station 983+30 and Station 999+00;

Section B = East side proceeding north and south, between manholes at Station 983+30 and Station 999+00;

Section C = West side proceeding north and south, between manholes at Station 999+00 and Station 1002+25;

Section D = West side proceeding north and south, between manholes at Station 1002+25 and Station 1002+60;

Section E = Proceed east and west, between manholes at Station 1002+60 (west side) and Station 1002+80 (east side); and

Section F = East side proceeding north and south, between manhole at Station 999+00 and where the track storm drain system tees into Segment E.

At the conclusion of the inspection activities, a report will be completed along with a copy of the videotape generated during the inspection activities and provided to the EPA. This report will document the location of any blockages, the presence of oil, and other significant findings (ACTA, February 2011).

2.3.2 Free Oil Quantification

On April 26, 2011, WGR gauged Baker Tank LT9007 located at Leeds Ave and in Baker Tank 1368ST located on the Shell Lubes Plant property for the purpose of estimating the volume of recovered free oil.

The Leeds Avenue tank was full of water and contained less than one half inch of oil. Based on measurements and calculations, the Leeds Avenue Baker Tank was estimated to contain 86 gallons of oil.

The Shell Lubes Baker Tank was gauged and the total height of all liquids was 5.01 feet. Total height of water was 4.67 feet, with 0.34 feet of crude oil. Per the tank strapping gauge posted on this tank, 4 inches equals approximately 700 gallons of oil.

Due to the notification from ACTA that additional oil was obtained from the recovery wells in May 2011 the Shell Baker Tank was gauged again on September 30th, 2011, WGR gauged the Baker Tanks to quantify a total of 743.75 gallons of water entrained oil. Based on August 30th 2011 sampling event the Intertek-Caleb Brett Labs report indicated this oil contained 19.20% water. The difference between the water content of the unaltered THUMB's crude oil and the recovered oil was 18.05%. This summarizes to be a total of 609.5 gallons of oil recovered from the Shell Lubes Plant adjacent recovery wells.

The total volume of free oil recovered in the Shell and Leeds Avenue Baker Tanks is 786 gallons.

2.3.3 Water Characterization and Management

During a Site meeting on April 26, 2011, Crimson and OSPR agreed that every third tank in series containing storm water would be sampled and characterized for hazardous constituents per Title 22 Section 66261. Water samples taken from the Baker Tanks were obtained using a 15 foot long re-usable bailer. The bailer was decontaminated first before the first tank and subsequently after each tank was sampled. The intent was to ensure unbiased and representative sampling.

Six additional Baker Tanks located at Leeds Avenue were inspected, none of these tanks contained free oil. The following two Baker tanks were selected for sampling:

Baker Tank 778NEA; and
Baker Tanks SFVP4646L.

Eight tanks located south of Opps Street near the Los Angeles County Power and Water (LACPW) lift station were inspected and none of the tanks contained free oil. All were full of water. Of these eight tanks the following three were selected for sampling;

Baker Tank 3062SDL;
Baker Tanks 445NSD; and
Baker Tanks SV21675L.

A total of five discrete samples, one from each of the Baker Tanks, were analyzed for the following:

Total petroleum hydrocarbons (TPH) (carbon chain analysis)	EPA 8015B;
Volatile organic compounds (VOCs)	EPA 8260B;
Semi VOCs (SVOCs)	EPA 8270C; and
Title 22 metals	EPA 6010B/470A.

In addition, two composite samples were analyzed for the following:

Organo-chlorine pesticides	EPA 8081A; and
Polychlorinated biphenyls (PCBs)	EPA 8082.

All samples were placed in a chilled ice chest and submitted to Test America Laboratories, Inc. (TA) using proper chain of custody protocol.

SVOCs, PCBs and pesticides were not detected above laboratory reporting limits. Of the VOC analytes only one low detection of 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene and tert-butyl alcohol (TBA) were reported at 4.4 micrograms per liter (ug/L), 3.6 ug/L and 87 ug/L, respectively, in the collected samples. TBA is not a constituent of crude oil and is likely the artifact of refining operations in the area. The highest reported TPH and metals concentrations in any of the samples are tabulated in Table 2-2.

2.3.4 Solid Waste Oil Quantification

A total of 5 solid waste roll off bins containing oily debris were stored on the Leeds Avenue Property at the time of the April 26, 2011 Site meeting. All contain oily debris and were visually inspected. Two of these bins were sampled for oil quantification and waste characterization. The two bins sampled are noted below.

RB21310ML
RB21623ML

One roll-off bin located at the Shell Lubes Plant contained oiled ballast. This material was generated during the installation of the oil recovery / observation wells. This bin was sampled for oil quantification and waste characterization. This bin is identified as follows.

1368ST/3235

Soil samples were collected from the bin containing ballast, sub ballast and soil. The delivered under chain of custody in a chilled ice chest to TA and analyzed for the following:

TPH (carbon chain)	EPA 8015B;
VOCs	EPA 8260B;
SVOCs	EPA 8270C; and
CA Title 22 Metals	EPA 6010B.

SVOCs and VOCs were not reported above the laboratory reporting limits. The results for TPH, metals and key aromatics are tabulated in Table 2-1.

On August 30, 2011 crude oil samples were collected from the Baker Tank located on the Shell Lubes Plant and Youngstown Lateral pipeline. Samples were submitted in containers supplied by TA in Irvine, CA. Custody seals were affixed on the sample containers in the presence of OSPR. Containers were then placed in chilled ice chests and shipped to the appropriate laboratories. Proper chain of custody protocol was also followed.

Analysis of oil consisted of the following:

TPH (carbon chain)	EPA 8015B;
VOCs	EPA 8260B;
SVOCs	EPA 8270C;
Polynuclear Aromatic Hydrocarbons (PAHs)	EPA 8270C SIM;
CA Title 22 Metals	EPA 6010B;
Flash Point	EPA 1010;

Water Content	ASTM D4006; and
Water Content	ASTM D4007.

The oil sampling is intended to assist with, but is not limited to, the following:

- Determine water content bound in the recovered oil;
- Help quantify accurate quantities of oil recovered from this release site;
- Identify constituents of concern for the site investigation;
- Provide a baseline for future monitoring of various constituents related to site investigations;
- Compare characteristics of weathered oil to unweathered oil; and
- Determine if certain hazardous waste characteristics apply to current and future waste generated.

Intertek-Caleb Brett Testing Services located in Signal Hill, California is an American Petroleum Institute certified laboratory and performed the water content analysis. TA an Environmental Laboratory Accredited Program (ELAP) facility provided the TPH, flash point and organics analysis.

Results of the weathered and non-weather crude sampling are presented in Table 2-3. The reported concentrations metals do not appear to be constituents of concern in oil. However, TPH, VOCs and PAHs do appear to be potential constituents of concern.

2.4 GEOLOGICAL AND HYDROGEOLOGY INFORMATION

Subsurface investigations conducted by URS and others at the Shell Lubes Plant have concluded that the top three to twelve feet of soil on-site generally consists of fill. The fill material consists of silty to clayey, very fine-grained sands with some debris. Underlying the fill material are thickly interbedded, laterally discontinuous sands and silty sands, which extend 20 to 30 feet below ground surface (bgs). Sands in this interval are very fine grained. Bivalve fragments are abundant in isolated layers (Shell, 2008).

Regionally, there are three groundwater aquifers underlying the site. These include the Silverado, Lynwood, and Gaspur/Gage aquifers.

A report on the Shell Lubes Plant provided information on the local groundwater hydrology. The following description is provided from that report.

A total of 34 groundwater monitoring wells are located on and adjacent to the Shell Lubes Plant and are included in the quarterly groundwater monitoring program. All of these wells are screened in the first encountered groundwater unit. On-site measured groundwater elevations ranged from approximately one foot below mean sea level (msl) at the southern end of the Shell Lubes Plant to 3 feet below msl at the northern edge. Depth to groundwater ranged from approximately 22 to 38 feet bgs. On-site uppermost groundwater flow direction is consistently to the north-northwest at an average gradient of approximately 0.007 feet/foot (ft/ft) (Shell, 2008). The northwesterly groundwater flow direction observed at the Site may be the result of Dominguez Gap Barrier Project injection wells interfering with the regional southerly gradient (Trihydro, 2003).

2.5 ENVIRONMENTAL AND/OR HUMAN IMPACT

Investigation directly related to the Dominguez Channel Spill will be conducted at the following locations.

Youngstown Lateral Pipeline - As part of the incident investigation, approximately 90 feet of pipeline will be removed in sections. Soil excavation and shoring will be required at both ends of the Youngstown Lateral as part of the pipeline removal. During the excavation operations, impacted soil will be removed from the excavation and disposed of offsite as part of the source removal. Soil samples at each end of the removed pipeline will be collected to quantify subsurface conditions and to determine if oil or other chemicals not related to the Youngstown Lateral release are present in the soil.

Shell Lubes Plant - Soil investigations will be conducted along the ACTA ROW in the vicinity and within the property boundaries of the Shell Lubes Plant. This investigation will include the removal of surface cover (ballast), exposing the French drain system and the sub-grade material adjacent to the French drain system to assess oil migration and impacts. Soil samples will be used for both vertical and lateral assessment of impacted areas in the vicinity of the Shell Lubes Plant.

French Drain Inspection – Oil within the pipe of the French drain system, both upstream and downstream of the release location was identified by ACTA in the video recording processes. Based on the results of the video and interviews with ACTA representatives, additional investigation on both the eastern and western side of the French drain system will be completed at locations spaced approximately 200 feet. The exact locations may vary depending upon the location of railroad side tracks, turnout, and access.

Additional investigation areas and the scope of investigations may be modified based on the findings during the course of investigation activities.

3.0 PROJECT DATA QUALITY OBJECTIVES

This section of the SAP describes the procedures by which the accuracy and validity of sample data generated during the assessment, remediation and post remediation sampling and analysis of soil and surface water will be maintained. The following subsections describe the project task and problem definition, Data Quality's (DQs), Data Quality Indicators (DQIs), data review and validation, data management, and assessment oversight associated with this project.

3.1 PROJECT TASK AND PROBLEM DEFINITION

The purpose of this SAP is to provide guidance for soil (including fill) investigations to determine the nature and extent of crude oil impacts resulting from the release of oil at the Youngstown Lateral. As previously stated, the discharged oil entered the French drain system along the ACTA ROW and encountered a blockage within the drain in the vicinity of the Shell Lubes Plant. Oily storm water backed up at a blockage in the French drain system and migrated westward onto the adjacent Shell Lubes Plant property. This SAP will guide investigations activities to assess the nature and extent of crude oil impacts within the affected area.

3.2 DATA QUALITY OBJECTIVES (DQOS)

The data quality objectives for this project are to:

- Assess the practical limits of crude oil impact from the subject release to soil and fill materials (including structural fill) within safely accessible locations the ROW;

- Assess concentrations of Contaminants of Potential Concerns (COPCs) at levels below applicable relevant and appropriate requirements (ARARs);

- Differentiate concentrations of COPCs against existing chemicals or petroleum hydrocarbons levels in soil where concentrations may exceed applicable regulatory limits The EPA Region 9 Regional Screening Levels (RSLs) and California Regional Water Quality Control Board, Los Angeles Region (RWQCB-LA) soil screening levels (SSLs) (RWQCB, 1996) will be considered as a guide in the investigation; and

- Identify chemicals of concern from data collected during the investigation phase of removal actions.

The precision, accuracy, representativeness, comparability, and completeness (DQIs) of the laboratory data will be assessed to determine the overall quality of the data. The Quality Assurance (QA) objectives for precision, accuracy, and completeness of each measurement parameter are based on prior knowledge of the analytical method, the method validation studies (using replicates, standards, spikes, calibrations, recovery data), and the requirements of the specific project. Definitions of these parameters and the applicable quality control procedures are described below.

3.3 MEASUREMENT QUALITY OBJECTIVES (MQOS)

The data will be evaluated against the following parameters:

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability (precision) of two or more measurements compared to their average values. Precision is calculated from results of duplicate sample analyses. The duplicate samples will consist of one or more of the following: co-located samples, field blind replicates, analytical laboratory replicate, and/or laboratory instrument replicate. Precision is quantitatively expressed as the relative percent difference (RPD), and is calculated as follows:

RPD = [(C1-C2)/(average of C1 and C2)] x 100

Where:

RPD = relative percent difference
C1 = larger of the two duplicate results
C2 = smaller of the two duplicate results

Laboratory duplicates will be analyzed at a frequency determined by the laboratory. Field duplicates will be collected at a rate of 5 percent and analyzed for site specific constituents of concern (COCs). The criteria for acceptable precision is determined by the laboratory. All duplicate samples will be analyzed for site-specific COCs. Following collection of samples for VOC analysis, the soil samples will be homogenized and split in the field for analysis of nonvolatile or extractable constituents.

Accuracy is a measure of the closeness (bias) of the measured value to the true value. The accuracy of test results can be assessed by analyzing a reference material, third party performance evaluation samples, or "spiking" samples in the laboratory with known standards (surrogates or matrix spikes) and determining the percent recovery (%R). The frequency of matrix spike analysis will be determined by the laboratory. The acceptance criterion is specific for each analyte. The %R for the laboratory for each analyte is provided in the laboratory Quality Assurance Manual (QAM).

Representativeness is a qualitative measure of how closely the measured results reflect the actual concentration or distribution of the constituent concentrations in the matrix sampled. The sampling plan design, sampling collection techniques, sample handling protocols, sample analysis methods, and data review procedures have been developed to assure the results obtained are representative of on-site conditions at the time of sample collection.

Completeness is defined as the percentage of measurements judged to be valid. Results will be considered valid if they are not rejected during data validation. The target completeness goal for this work will be 90 percent for a given analysis.

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. The use of standard regulatory methods and procedures for both sample collection and laboratory analysis will make data collected comparable to both internal and other data generated.

Detection Limits or laboratory reporting limits are specified in the laboratory QA/Quality Control (QC) documentation in the laboratory QAM. These limits must be sufficiently low to allow assessment of the data against the DQOs. Where these limits are raised due to matrix or chemical interferences, or elevated concentration, the dilution factor will be documented on the analytical report form.

Data Turn Around Time (TAT) is the time it takes the laboratory to return data to the decision makers from the time that the laboratory receives the data. In order to facilitate the decision making process in the field, the TAT used on this project will not exceed 5 days.

3.4 DATA REVIEW AND VALIDATION

The QA Manager, or his designee, will review the field and laboratory QA/QC data to determine whether the data meet the above DQO/DQI objectives. In the event that the criteria are not met, the impact to data quality will be evaluated and a determination will be made as to the need for resampling and/or reanalysis. Any data that falls outside the QA/QC criteria or cannot be validated will be flagged in the text and tables.

The laboratory will provide Tier 3 level QA data packages for validation.

3.5 DATA MANAGEMENT

Data management will entail the following to ensure accurate transfer of data from collection to analysis:

- Use of standardized forms that include field notes, field data sheets, chain-of-custody forms, and sample labels;
- Proof reading of notes and data as a check against transportation errors;
- Review of field notes and data by the QA Manager for completeness and consistency;
- Review of analytical data by the QA Manager as indicated in Section 3.4 above; and
- Review of final report by the Project Manager.

3.6 ASSESSMENT OVERSIGHT

A field audit may be conducted to verify that sampling is performed in accordance with the procedures established herein. A performance and system audit of the laboratory may be conducted to verify analyses are completed as identified in the laboratory's Quality Assurance Manual (QAM). The audits of field and laboratory activities may include two independent parts: internal and external audits.

4.0 SAMPLING RATIONALE

Detectable COPC concentrations may exist at the Site as a result of other sources unrelated to the Dominguez Channel Spill. Investigation soil or structural fill samples directly related to the

Dominguez Channel Spill will be compared to crude oil samples from the THUMS and Youngstown pipelines. These investigational and crude oil samples have been used to identify the COPCs actually related to the Dominguez Channel Spill. Soil contamination unrelated to the Dominguez Channel Spill will not be investigated by Crimson.

Crimson has collected and analyzed crude oil samples from the Youngstown production which is transported in the Youngstown Lateral pipeline. As these oils are cited by the EPA as possible sources of oil in the release, the hydrocarbon “fingerprint” analysis will be used to identify “markers” for comparison purposes. Depending on the findings of initial investigations, background samples may be collected from similar use areas that are not affected by the crude oil release.

Soil samples will be collected for the purpose of evaluating the limits of crude oil impact and to evaluate waste materials for disposal or reuse/recycling, as appropriate.

Investigation sampling will generally be biased high to identify the limits of impact and worst-case conditions. The sampling rationale presented herein has as its basic goal the intent of identifying COCs and characterizing areas of concern (AOCs) within the Site.

As identified in the Project Plan, crude oil general COPCs consist of TPH, VOCs, and PAHs. Actual VOC and PAH analytes of concern will be determined in the investigation phase. To determine which COPCs will be carried forward as COCs, data collected during investigation will be compared to reference concentrations and removal goals. In addition, statistical evaluations will be performed using the methods set forth in EPA SW-846 to evaluate whether a specific COC may be used as a surrogate for cleanup and confirmation of other analytes. Experience has shown at many crude oil sites that TPH may be used as a surrogate for cleanup for VOCs and PAHs. The surrogate COC will be selected based on statistical analysis of investigation data.

In soil, TPH will likely be used as the primary surrogate for evaluating removal activities, with secondary criteria based on concentrations of aromatics (benzene, toluene, ethyl benzene and total xylenes) and PAHs. The investigation criteria for TPH, VOCs, and PAHs will be EPA RSLs and RWQCB-LA SSLs.

Contaminated soil will be removed when removal does not jeopardize the structural integrity of building, roadways, ACTA railroads, utilities or other assets. The operational goal is the removal of all “free oil” (phase-separated oil) and soil impacted above the Site’s removal goals. The Site removal goal values represented in the Project Plan are for contaminants related to the industrial soil. The proposed quantitative investigation goal for TPH oil range will be 10,000 milligrams per kilogram (mg/kg) in soil. Until such time as TPH can be established as the surrogate COC for removal activities, the following preliminary removal goals will be used at the Site for aromatics and naphthalene, based on the EPA Region IX RSL.

Benzene	5.4 mg/kg
Toluene	45,000 mg/kg
Total Xylenes	2,700 mg/kg.
Naphthalene	18 mg/kg

Quantification and reporting of TPH will be full carbon chain ranges of <C12, C13 to C22 and C23 to C40.

Investigation and analysis will allow data evaluation consistent with these goals and action levels.

4.1 SOIL SAMPLING

Soil samples will be collected from safely accessible areas of the railroad right-of-way, the French drain system, and from the areas adjacent to railroad ROW and pipeline. Soil and fill samples will be collected from the French drain system and surrounding area using manual sampling methods that will include spades, battery or pneumatic auger drills, breaker bars and hand augers as detailed in SOP ERPA-001 and equipment will be decontaminated according to SOP ERPA-002. Additional soil samples may be collected from the railroad ROW and French drain system using other suitable methods. Due to the level of compaction and coarse nature of the sub ballast and other fill material VOC samples will be collected in glass jars and not in accordance with EPA method 5035. Soil sample locations will be determined based on visual evidence of oil impact and previous knowledge of subsurface impact.

The exact locations of soil borings will be determined during the investigation phase and upon review of the video tape from the 8-inch track storm drain system. The sampling locations described in this SAP may be changed based on encountered field conditions. The following locations along the spill area will be investigated:

Youngstown Lateral Pipeline—as part of the incident investigation, approximately 90 feet of pipeline will be removed in sections of undetermined length dependent upon access provided by the adjacent property owners. Soil excavation and shoring will be required at both ends of the Youngstown Lateral as part of the pipeline removal (Figure 3 of Project Plan). Any impacted soil will be removed from the excavation and disposed of offsite as part of the source removal. Soil samples at each end of the removed pipeline will be advanced to confirm the vertical and lateral limits of impact surrounding the damaged casing. Soil samples will be collected where safely accessible as described below.

- Where visually impacted by crude oil, soil samples will be collected from the sidewalls and bottom of the excavation once the visually impacted soil has been removed. Photo documentation and reference point will be used to identify the location of visual free oil.

- Based on safety concerns, soil samples within the excavation may be collected directly from the bucket of the excavation equipment. One soil sample approximately every 10 linear feet will be collected from the centerline of the excavation.

- One soil samples every 10 linear feet of the perimeter edge will be collected from the sidewall of the excavation.
- Bottom soil samples will be collect 0.5 feet and 3 feet below the visual extent of impact from the excavation (if impact is evident, deeper samples will be attempted).

- Sidewall samples will be collected 0.5 feet and 3 feet beyond the visual extent of impact from the excavation sidewall (if impact is evident, deeper samples will be attempted).

- Sample locations and depths may be modified and will be determined by encountered field conditions.

- If the bottom or sidewall of the excavation consists of exposed ballast material or gravel, no sample will be collected and a visual assessment will be conducted to ascertain the need for removal based on evidence of free oil.

- All visually impacted soil will be removed to the limit of excavation necessary to install the engineered shoring unless liquid free oil is identified. If free oil is present, the excavation equipment may be used to remove all accessible soil to practical lateral and vertical extent.

- Due to the safety concern associated with the ROW, there exists the possibility that some impacted soil may not be removed or sampled. Approval from EPA and ACTA to leave impacted soil in-situ may be requested based on the location of the soil.

Shell Lubes Plant – The Shell Lubes Plant property is primarily asphalt pavement (Figure 2 of Project Plan). Confirmation with the Shell Lubes Plant has determined that the asphalt surface pavement has been cleaned and is free of any oil. Investigation soil boring in non-asphalt areas will occur if there are indications of impact from crude oil. A Work Activity Plan and recommendations for any future work required in this portion of the project will be provided to EPA upon completion of investigation.

Soil samples will be collected from safely accessible areas of the Shell Lubes Plant that present evidence of crude oil contamination. All boring or other sampling locations must be approved in advance of sampling activities by Shell. Soil samples will be collected from the Shell Lubes Plant with a Geoprobe direct push type rig or using manual sampling methods that will include spades and hand augers.

Soil sample locations will be determined based on visual evidence of surface impact and previous knowledge of subsurface impact.

- Due to the safety concern associated with the ROW, some impacted soil may not be removed or sampled. Approval from EPA, Shell, and ACTA to leave impacted soil in-situ may be requested based on the location of the impacted area.

Subsurface soil conditions will be continuously logged and samples will be collected to confirm the vertical and lateral limits of impact. At least two soil samples will be collected for analyses: one within the contaminated portion of the soil column; and one below the visually evident impacts to assess the limits of impact.

French drain system— Areas where blockages of the French drain system were reported in the video tape provided by ACTA will be given priority for inspection by Crimson as part of the free oil recovery (Figure 4 of Project Plan). Impacted ballast material and gravel will be removed as part of the oil removal and investigation. The exact number and locations of blockages along the French drain will be determined from information and video data provided by ACTA. Soil samples along the western and eastern side of the French drain system adjacent to the railroad track will be collected to confirm the vertical limits of impact surrounding the blockage area. Soil samples will be collected as described below only where safely accessible.

- Soil samples will be collected adjacent to the existing French drain and/or utility piping.

- One investigational soil boring will be advanced at regular intervals not exceeding 200 feet along the French drain system where impact is evident or suspected in the subgrade.

- One investigational soil boring will be advanced where known utility laterals intersect the French drain system.

- Soil sample depths and intervals will be determined based on visual evidence of impact. In general, samples will be collected at 0.5 feet below the base of the impacted surface release point (i.e.: bottom of French drain, top of sub ballast, etc.), and below the bottom of visual oil staining, or at two feet bgs, If impacts appear to extend, deeper than two feet, deeper samples will be attempted.

- Sample locations and depths may be modified and will ultimately be determined by encountered field conditions. Careful field records and photograph logs will be maintained to document the decision making process.

- Where the bottom of the French Drain consists of exposed concrete or cemented ballast larger than 2 inches in diameter, no sample will be collected and a visual assessment will be conducted to ascertain the need for removal based on evidence of free oil.

Due to the safety concern associated with work in the railroad ROW, some impacted soil may not be sampled. These areas will be documented.

Depending on the results of the crude oil sample analyses, investigation samples may be analyzed for one or more of the following:

TPH-full carbon chain	EPA 8015B;
VOCs	EPA 8260B; and
PAHs	EPA 8270C SIM.

VOC and SVOC analyses will be selected based on positive TPH results. No sample will be analyzed for VOCs and PAHs, where TPH is not detected above laboratory reporting limits. Samples exhibiting the highest concentrations of TPH will generally be analyzed for VOCs and PAHs by EPA method 8260B and 8270C SIM, respectively. Approval from the Unified Command will be requested prior to eliminating analyses that are approved in this SAP.

4.2 SEDIMENT SAMPLING

Not Applicable

4.3 SURFACE WATER SAMPLING

Not Applicable

4.4 OTHER SAMPLING

Not Applicable

5.0 REQUEST FOR ANALYSES

TestAmerica Analytical Laboratories, Inc. (TestAmerica), Zymax Forensic Laboratory (Zymax) and Jones Environmental (Jones) have been selected as the analytical laboratories to analyze soil and water samples. A majority of the assessment samples will be submitted to TestAmerica. QC including duplicates and splits samples will be submitted to both TestAmerica and Zymax. Jones will be used for mobile laboratory services.

With approval from the EPA, other laboratories may be used to quantify COPCs depending on the volume of samples generated and the capacity of the laboratory to analyze the samples within holding times or required expedited TAT or for quality control and confirmation purposes.

5.1 ANALYSES NARRATIVE

Section 4 describes the analyses proposed for each area. These analyses will be conducted until such time that a specific analyte(s) are determined to no longer be COC. If a specific analyte is determined not to be a COC based on concentration or background study, a petition will be submitted to the unified command requesting that the analyte no longer be part of the sampling program.

Sample analytical requirements are summarized in Tables 5.1 and 5.2 for soil and water samples, respectively. Additional data validation and acceptance criteria, as well as proposed method detection limits (MDLs) and RSLs for soil and groundwater are provided in Tables 5.3 and 5.4.

5.2 ANALYTICAL LABORATORY

TestAmerica, Zymax, and Jones are certified to perform the analyses indicated herein by the California ELAP.

6.0 FIELD METHODS AND PROCEDURES

The following subsections provide guidance for field methods and procedures that include field equipment; sampling soil; and decontamination. Additional detail is included in SOPS ERPA-001 (Soil Sampling); ERPA-002 (Decontamination Procedures); ERP-011 (Field Notebook); ERPA-302 (Variance/Time Delay Form); and ERPA-303 (Waste Management Form).

6.1 FIELD EQUIPMENT

The list of equipment that will be used in the field to collect samples, including decontamination equipment is presented in Table 6-1.

6.1.1 Calibration of Field Equipment

Field instruments will be calibrated prior to each daily sampling event and calibration performance checks will be performed as described in Table 6-2. Equipment maintenance and calibration records will be recorded on the project air monitoring forms on a daily basis.

Calibration and maintenance records for all field equipment will be kept and stored with the project field notes at the Beacon Energy office.

6.2 FIELD SCREENING

Not Applicable-Using Photo Ionization Detector (PID) already and no less accurate method.

6.3 SOIL

Exact soil sampling locations will be determined in the field based on accessibility, visible signs of potential contamination (e.g., stained soils), and topographical features which may indicate location of hazardous substance disposal (e.g., depressions that may indicate a historic excavation). Soil sample locations will be recorded in the field logbook as sampling is completed. A sketch of the sample location will be entered into the logbook and any physical reference points will be labeled. If possible, distances to the reference points will be given.

6.3.1 Surface Soil Sampling

Surface soil samples collected for lateral characterization of the extent of impact in soil will be sampled using a sampling trowel or equivalent methods (SOP ERPA – 001) to evaluate the lateral extent of crude oil impact. Surface soil samples will be collected within 6-12 inches of the ground surface. The sampling trowel will be used to collect the samples and then transfer samples to the appropriate containers. Soil samples will be selected for chemical analysis based on visual evidence of oil discoloration and availability of sufficient quantity to define the extent of impact in the subsurface.

Based on field observation of subsurface characteristics, samples will be collected at select intervals for measurement of headspace volatile organic vapors using a PID calibrated to 100 parts per million by volume (ppmv) span gas. The following protocols will be followed in taking headspace measurements:

1. Seal sample in a labeled one quart resealable plastic bag (i.e.; Ziploc®).
2. Manually break up and homogenize the sample.
3. Carefully open the corner of the bag and insert tip of the PID into the bag while taking care to seal the bag round the tip with finger tips.
4. Once the reading stabilizes (approximately 5 seconds), record the PID reading as ppmv.

All borings or sample points will be continuously sampled and logged.

Samples for analysis of nonvolatile components will be discharged directly from the bailer into 4 to 8 ounce jars and hand packed to remove dead air headspace and sealed with a Teflon-lined screw cap lid.

Excess set-aside soil from the above sampled interval will then be repacked into the hole.

6.3.2 Subsurface Soil Sampling

Subsurface soil samples will be collected for vertical characterization of the extent of impact in soil and will be sampled using a hand auger, hammer drill, or equivalent methods to evaluate the vertical extent of crude oil impact (SOP ERPA-001). Subsurface soil samples are generally those that are to be collected more than 12 inches below the ground surface, unless otherwise noted.

Continuous samples may be collected using a Geoprobe rig or other methods using samplers lined with 1.5- to 2-inch inside diameter clear acetate liners. The sample liner will be split longitudinally for characterization and logging. The entire length of the split core will be scanned with a PID. Samples will be collected for VOC and non-VOC analysis within portions of the core where impacts are evident and from “clean” portions above and below the impact zone to define the extent of impact.

Based on field observation of subsurface characteristics, samples will be collected at select intervals for measurement of headspace volatile organic vapors using a PID calibrated to 100 ppmv span gas. The following protocols will be followed in taking headspace measurements:

1. Seal sample in a labeled one quart resealable plastic bag (i.e. Ziploc®).
2. Manually break up and homogenize the sample.
3. Carefully open the corner of the bag and insert tip of the PID into the bag while taking care to seal the bag round the tip with finger tips.
4. Once the reading stabilizes (approximately 5 seconds), record the PID reading as ppmv.

All borings or sample points will be continuously sampled and logged.

Samples for analysis from hand augers, manual auger drills or chipping tools will be placed directly into 4 to 8 ounce jars and hand packed to minimize dead air headspace and sealed with a Teflon-lined screw cap lid.

Excess set-aside soil from the above sampled interval will then be repacked into the hole.

6.4 SEDIMENT SAMPLING

Not Applicable

6.5 WATER SAMPLING

6.5.1 Surface Water Sampling

Not Applicable

6.5.2 Groundwater Sampling

Not Applicable

6.5.2.1 Water-Level Measurements

Not Applicable

6.5.2.2 Purging

Not Applicable

6.5.2.3 Well Sampling

Not Applicable

6.6 OTHER

Not Applicable

6.7 DECONTAMINATION PROCEDURES

The decontamination procedures that will be followed are in accordance with approved EPA procedures and SOP ERPA-002. Decontamination of sampling equipment must be conducted consistently as to assure the quality of samples collected. All equipment that comes into contact with the sample media will be decontaminated. Disposable equipment intended for one-time use will be packaged for appropriate disposal. Decontamination will occur prior to and after each use of a piece of equipment. All sampling devices used will be decontaminated according to the following general procedure:

Tap water and non-phosphate detergent wash using a brush or scrubber;
Tap water rinse; and
Deionized/distilled water rinse.

All cleaned materials shall be stored in manner to prevent contact with potentially contaminated media using plastic bags or by being placed upright in clean buckets or other containers. Materials to be stored more than a few hours will also be covered.

Decontamination fluids will be discharged to skim ponds or other approved areas where removal activities are ongoing.

7.0 SAMPLE CONTAINERS, PRESERVATION, PACKAGING AND SHIPPING

Proper sample container will be obtained from the laboratory prior to field operations. Sample containers used will be pre-cleaned and will not be rinsed prior to sample collection. Preservatives, if required, will be added by the laboratory or supplier prior to shipment to the field. The following subsections provide a discussion concerning containers, preservation, and storage for each type of analysis.

7.1 SOIL SAMPLES

Soil samples will be contained in hand packed 4 to 8-ounce glass jars or 6-inch brass or stainless steel sample tubes. The top of the container will be struck off level to preclude headspace. Glass jars will be sealed with a Teflon-lined screw cap lid, while tube samples will be capped on each end with a Teflon sheet followed by tight-fitting plastic caps sealed with non-VOC tape. The sample will be preserved in an ice-chilled cooler at approximately 4°C.

7.2 SEDIMENT SAMPLES

Not Applicable

7.3 WATER SAMPLES

Not Applicable

7.4 OTHER SAMPLES

Not Applicable

7.5 PACKAGING AND SHIPPING

All sample containers will be placed in a strong-outside shipping container (a steel-belted cooler). The following outlines the packaging procedures that will be followed for low concentration samples:

1. When ice is used, pack it in zipper-locked, double plastic bags. Seal the drain plug of the cooler with fiberglass tape to prevent melting ice from leaking out of the cooler.
2. The bottom of the cooler should be lined with bubble wrap to prevent breakage during shipment.
3. Check screw caps for tightness and, if not full, mark the sample volume level of liquid samples on the outside of the sample bottles with indelible ink.
4. Secure bottle/container tops with clear tape and custody seal all container tops.
5. Affix sample labels onto the containers with clear tape.
6. Wrap all glass sample containers in bubble wrap to prevent breakage.
7. Seal all sample containers in heavy duty plastic zipper-lock bags. Write the sample numbers on the outside of the plastic bags with indelible ink.

8. Place samples in a sturdy cooler(s) lined with a large plastic trash bag. Enclose the appropriate chain-of-custody forms in a zipper-lock plastic bag affixed to the underside of the cooler lid.
9. Fill empty space in the cooler with bubble wrap or Styrofoam peanuts to prevent movement and breakage during shipment.
10. Ice used to cool samples will be double sealed in two zipper-lock plastic bags and placed on top and around the samples to chill them to the correct temperature.
11. Each ice chest will be securely taped shut with fiberglass strapping tape and custody seals will be affixed to the front, right and back of each cooler. Records will be maintained by the project sample custodian with the following information:
    - Name and location of the site or sampling area;
    - Total number(s) by estimated concentration and matrix of samples shipped;
    - Carrier, air bill number(s), method of shipment;
    - Shipment date and when it should be received by lab;
    - Irregularities or anticipated problems associated with the samples; and
    - Whether additional samples will be shipped or if this is the last shipment.

8.0 DISPOSAL OF RESIDUAL MATERIALS

In the process of collecting environmental samples, several different types of potentially contaminated waste will be generated including:

- Used personal protective equipment (PPE);
- Disposable sampling equipment; and
- Decontamination fluids.

Waste Management Form ERPA-303 will be used to track the type, amount, location, and disposition of these various wastes.

8.1 USED PPE AND DISPOSABLE EQUIPMENT

Used PPE and disposable equipment will be double bagged and placed in a municipal refuse dumpster. These wastes are not considered hazardous and can be sent to a municipal landfill. Any PPE and disposable equipment that is to be disposed of which can still be reused will be rendered inoperable before disposal in the refuse dumpster.

8.2 DECONTAMINATION FLUIDS

Decontamination fluids that will be generated in the sampling event will consist of deionized and tap water rinsate with dilute residual contaminants. The decontamination fluid will be properly disposed of at a local TSD facility.

9.0 SAMPLE DOCUMENTATION AND SHIPMENT

The following subsections provide details concerning sample documentation and shipping procedures including field notes, labeling, chain-of-custody, custody seals, and packaging and shipment.

9.1 FIELD NOTES AND LOGBOOKS

Because sampling situations vary widely, field notes will be as descriptive and inclusive as possible; such that anyone reading the entries should be able to reconstruct the sampling situation from the recorded information. Language within field notes will be objective, factual, and free of inappropriate or ambiguous terminology. All field personnel are to date and sign any data entries. All field documentation will be retained. Additional details on field notes can be found in SOP ERPA-011.

Sampling field data sheets include information on specific activities related to collection of a single sample. The sampling field data sheets will be completed in the field at the time of the sample collection by the sampling personnel. A Sampling Field Data Sheet is provided in Attachment B.

The field data recorded at the time of sample collection provides unambiguous identification of each sample. At a minimum, the following information will be recorded during the collection of each sample:

- Sample location (depth (in feet), description, and identified on maps);
- Site or sampling area sketch showing sample location and measured distances or global position system (GPS) coordinates;
- Sampler's name;
- Date and time of sample collection;
- Designation of sample as composite or grab;
- Type of sample;
- Type of sampling equipment used;
- Field instrument readings and calibration;
- Field observations and details related to analysis or integrity of sample;
- Preliminary sample descriptions;
- Sample preservation; and
- Lot numbers of the sample containers, sample identification numbers and any explanatory codes, and chain-of-custody form numbers.

In addition to the sampling information, the following specific information will also be recorded in the field notes:

- Time of arrival/entry on site and time of site departure;
- Other personnel on site;
- Summary of any meetings or discussions with tribal, contractor, or federal agency personnel;
- Procedural deviations and/or personnel changes; and
- Calibration records.

9.2 PHOTOGRAPHS

Photographs will be taken at the sampling locations and at other areas of interest on the site or sampling area. They will serve to verify information entered in the field logbook. For each photograph taken, the following information will be written in the logbook or recorded in a separate field photography log:

- Time, date, location, and weather conditions;
- Description of the subject photographed; and
- Name of person taking photographs.

9.3 LABELING

All samples collected will be labeled in a clear and precise way for proper identification (I.D) in the field and for tracking in the laboratory. The samples will have pre-assigned, identifiable, and unique sample I.D. numbers. At a minimum, the sample labels will contain the following information in indelible ink: sample I.D., sample location, date of collection, analytical parameter(s), and method of preservation.

Each sample will be given a unique sample I.D. number for reference on maps, chain of custody documentation and field logs. The I.D. will designate whether the general location of the sample, the media sampled and a unique number identifying the sample location and depth. The nomenclature for each sample will be identified as follows:

ZV-XXY-ABB-CC

Where:

Z = Activity Phase
'N' for Investigation phase
'C' for confirmation phase

V = Duplicate sample
'V' for duplicate samples
Otherwise leave blank

X = General Location
'YL' for Youngstown Lateral
'FD' for French Drain
'SD' for Storm Drain Collection
'SL' for Shell Lubes Plant

Y = Media
'W' for water
'S' for soil

A = Sample Point Type

‘T’ for transect
‘H’ for hand auger
‘G’ for grab sample
‘B’ for boring sample

BB = Unique transect, or boring number (i.e. 01, 02….10, 11, etc.)

CC = Sample depth (i.e. 0.5, 2.5, 5.0 feet, etc.)

Trip blanks and equipment blanks will be labeled with the nomenclature of Z-XX-Y-AABBCC. Where:

Z = Activity Phase
‘N’ for investigation
‘C’ for confirmation

X = General Location
‘YL’ for Youngstown Lateral
‘FD’ for French Drain
‘SD’ for Storm Drain Collection
‘SL’ for Shell Lubes Plant

Y = Media
‘W’ for water or aqueous sample

AABBCC = Sample Date
‘AA’ = month, ‘BB’ = day, and ‘CC’ = year of sample collection

9.4 SAMPLE CHAIN-OF-CUSTODY FORMS AND CUSTODY SEALS

Chain-of-custody record forms are used to document sample collection and shipment to laboratories for analysis. All sample shipments for analyses will be accompanied by a chain-of-custody record. A copy of the form is found in Attachment C. Form(s) will be completed and sent with the samples for each shipment. If multiple coolers are sent to a single laboratory on a single day, form(s) will be completed and sent with the samples for each cooler.

The chain-of-custody form will identify the contents of each shipment and maintain the custodial integrity of the samples. Generally, a sample is considered to be in someone's custody if it is either in someone's physical possession, in someone's view, locked up, or kept in a secured area that is restricted to authorized personnel. Until the samples are shipped, the custody of the samples will be the responsibility of the sampler. The sampling team leader or designee will sign the chain-of-custody form in the "relinquished by" box and note date, time, and air bill number. The sample numbers for all Equipment blank samples, reference samples, laboratory QC samples, and duplicates will be documented on this form (see Section 10.0). A copy will be retained in the master files.

10.0 QUALITY CONTROL

The following subsections discuss collection and analysis of QC samples including field QC and laboratory QC samples.

10.1 FIELD QUALITY CONTROL SAMPLES

Field quality control samples are intended to help evaluate conditions resulting from field activities and are intended to accomplish two primary goals: (1) assessment of field contamination (equipment blanks); and (2) assessment of sampling variability (duplicate samples). The former identifies substances introduced in the field due to environmental or sampling equipment and are assessed using blanks of different types. The latter includes variability due to sampling technique and instrument performance as well as variability possibly caused by the heterogeneity of the matrix being sampled and is assessed using replicate sample collection. The following sections cover field QC.

10.1.1 Assessment of Field Contamination (Blanks)

Not Applicable see below

10.1.1.1 Equipment Blanks

Equipment blanks will be collected in lieu of field blanks as they provide the best overall means of assessing contamination arising from the equipment, ambient conditions, sample containers, transit, and the laboratory. One equipment blank will be collected per day that sampling equipment is decontaminated in the field. Equipment blanks will be obtained by passing deionized water through or over the decontaminated sampling devices used that day. The Equipment blanks will be analyzed for VOCs, SVOCs, and TPH. The equipment rinsate blanks will be preserved, packaged, and sealed in the manner described for the environmental samples.

10.1.1.2 Field Blanks

Not Applicable

10.1.1.3 Trip Blanks

One travel or trip blank will be submitted for VOC analysis with each cooler containing sample requiring VOC analyses. Trip blanks are supplied by the laboratory with the sampling containers at the start of field activities and accompany the sample containers throughout the project.

10.1.1.4 Temperature Blanks

For each cooler that is shipped or transported to an analytical laboratory, a 40-mL VOA vial or pre-manufactured temperature blank will be included that is marked “temperature blank.” This blank will be used by the laboratory sample receiver to check the temperature of samples upon receipt.

10.1.2 Assessment of Field Variability (Field Duplicate or Co-located Samples)

Field duplicate samples will be collected from water, soil and sediment samples at a rate of 5 percent or one in 20 samples. VOC duplicates will be collected prior to agitation. Once the

VOC samples are collected, the soil samples designated for field duplication will be split in half and sample placed in clean sample containers.

When collecting duplicate water samples, bottles with the two different sample identification numbers will alternate in the filling sequence. Note that bottles for one type of analysis will be filled before bottles for the next analysis are filled. Samples for volatiles will always be filled first.

Duplicate samples will be preserved, packaged, and sealed in the same manner as other samples of the same matrix. A separate sample number and station number will be assigned to each duplicate, and it will be submitted blind to the laboratory. Field duplicates will be identified in the field log book.

10.2 BACKGROUND SAMPLES

Background sampling may be required to evaluate the occurrence of constituents of concern in soil, groundwater and other media. The constituents of concern (i.e.; TPH, metals, VOCs and SVOCs) are known contaminants associated with urban activities and may be present as artifacts of regional background. For example, elevated metals, TPH and other contaminants are frequently encountered in railroad ballast. Similarly, runoff from industrial properties and roads influences the quality of water in urban drainages. Crimson may elect to collect background samples (two to three samples minimum) upgradient or adjacent to areas affected by the oil release to assess constituents of concern in ballast, French drain backfill, soil and surface water.

Background samples will be collected, preserved and analyzed following the same procedures as project environmental samples.

10.3 FIELD SCREENING, CONFIRMATION AND SPLIT SAMPLES

Not Applicable

10.3.1 Field Screening Samples

Not Applicable

10.3.2 Confirmation Sampling

Not Applicable

10.3.2.1 Soil Confirmation Samples

Not Applicable

10.3.2.2 Surface Water Confirmation Samples

Not Applicable

10.3.3 Split Samples

Split samples may be collected depending on the results of primary samples, laboratory QA/QC results, and the degree of heterogeneity reported in duplicate samples. Split samples will be submitted to an independent third party laboratory for analysis and comparison with primary laboratory samples. At this point, split sample analysis is not anticipated.

10.4 LABORATORY QUALITY CONTROL SAMPLES

Laboratory QC samples are analyzed as part of standard laboratory practice. The laboratory monitors the precision and accuracy of the results of its analytical procedures through analysis of QC samples.

Laboratory QC checks are detailed in the laboratory QAM. In general, the QC requirements include the following:

- Trip blanks;
- Reagent/preparation/calibration blanks (applicable to inorganic analysis);
- Instrument blanks;
- Initial calibration;
- Initial calibration verification;
- Continuing calibration verification;
- MDL verification;
- Method RL verification;
- MS/MSDs;
- Surrogate spikes;
- Laboratory duplicates;
- LCS samples;
- Internal standard areas for Gas Chromatograph/Mass Spectrometer (GC/MS) analysis; and
- Mass tuning for GC/MS analysis.

All data obtained will be properly recorded. The data package will include a full deliverable package capable of allowing the recipient to reconstruct QC information and compare it to QC criteria. The laboratory should re-analyze any samples analyzed in non-conformance with the QC criteria, if sufficient volume is available. It is expected that sufficient volumes/weights of samples will be collected to allow for re-analysis when necessary. Data packages will be available in electronic form.

11.0 FIELD VARIANCES

As conditions in the field may vary, it may become necessary to implement minor modifications to sampling as presented in this plan. Also, as conditions are revealed and AOCs are better defined, modifications are expected with respect to confirmation sampling locations, etc. All field variances will be recorded on a Variance / Time Delay Form (ERPA-302), the Unified Command will be notified, and a verbal approval will be obtained before implementing the changes. Modifications to the approved plan will be documented by updating this SAP.

12.0 FIELD HEALTH AND SAFETY PROCEDURES

A site specific health and safety plan (HASP) has been developed for this project under separate cover. The site specific HASP will be submitted with each Work Activities Plan (WAP). In addition, each SOP includes a section on Health and Safety Considerations.

TABLES

Table 2-1: Contaminants of Concern – Previous Investigations (Matrix = Solid/Ballast Material)

Analytical Parameter (Contaminants of Concern)	Date of sampling	Sampling contractor	Laboratory Analytical Results[1] (units)	Regulatory Limit
TPH gasoline (C4-C12)	4/26/2011	WGR Southwest	78 mg/kg	1,000 mg/kg (RWQCB SSL)
TPH diesel (C13-C28)	4/26/2011	WGR Southwest	1,369 mg/kg	1,000 mg/kg (RWQCB SSL)
TPH oil (C29-C40)	4/26/2011	WGR Southwest	218 mg/kg	10,000 mg/kg (RWQCB SSL)
Benzene	4/26/2011	WGR Southwest	ND < 100 µg/kg	5.4 mg/kg (RSL)
Toluene	4/26/2011	WGR Southwest	ND < 100 µg/kg	45,000 mg/kg (RSL)
Ethylbenzene	4/26/2011	WGR Southwest	ND < 100 µg/kg	27 mg/kg (RSL)
Xylenes, total	4/26/2011	WGR Southwest	ND < 200 µg/kg	2,700 mg/kg (RSL)
Naphthalene	4/26/2011	WGR Southwest	ND < 250 µg/kg	18 mg/kg (RSL)
Mercury	4/26/2011	WGR Southwest	0.074 mg/kg	43 mg/kg (RSL)
Antimony	4/26/2011	WGR Southwest	ND < 9.9 mg/kg	410 mg/kg (RSL)
Arsenic	4/26/2011	WGR Southwest	5.3 mg/kg	1.6 mg/kg (RSL)
Barium	4/26/2011	WGR Southwest	92 mg/kg	190,000 mg/kg (RSL)
Beryllium	4/26/2011	WGR Southwest	ND < 0.49 mg/kg	2,000 mg/kg (RSL)
Cadmium	4/26/2011	WGR Southwest	ND < 0.49 mg/kg	800 mg/kg (RSL)
Chromium	4/26/2011	WGR Southwest	14 mg/kg	1,500,000 mg/kg (RSL)
Cobalt	4/26/2011	WGR Southwest	5.2 mg/kg	300 mg/kg (RSL)
Copper	4/26/2011	WGR Southwest	22 mg/kg	41,000 mg/kg (RSL)
Lead	4/26/2011	WGR Southwest	23 mg/kg	800 mg/kg (RSL)
Molybdenum	4/26/2011	WGR Southwest	ND < 2.0	5,100 mg/kg (RSL)
Nickel	4/26/2011	WGR Southwest	12 mg/kg	20,000 mg/kg (RSL)
Selenium	4/26/2011	WGR Southwest	ND < 2.0 mg/kg	5,100 mg/kg (RSL)
Silver	4/26/2011	WGR Southwest	ND < 0.99 mg/kg	5,100 mg/kg (RSL)
Thallium	4/26/2011	WGR Southwest	ND < 9.9 mg/kg	10 mg/kg (RSL)
Vanadium	4/26/2011	WGR Southwest	27 mg/kg	5,200 mg/kg (RSL)
Zinc	4/26/2011	WGR Southwest	91 mg/kg	310,000 mg/kg (RSL)

mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
Sample collected from impacted ballast material located in roll-off bin #1368ST/3235 at Shell Lubes Plant.
RSL –Regional Screening Level for Industrial Soil (EPA, June 2011)
RWQCB SSL – Soil Screening Levels

Table 2-2: Contaminants of Concern – Previous Investigations

(Matrix = Storm water / Baker Tank)

Analytical Parameter (Contaminants of Concern)	Date of sampling	Sampling contractor	Laboratory Analytical Results[1] (units)	Regulatory Limit
TPH gasoline (C4-C12)	4/26/2011	WGR Southwest	4,600 µg/L	
TPH diesel (C13-C28)	4/26/2011	WGR Southwest	2.99 mg/L	
TPH oil (C29-C40)	4/26/2011	WGR Southwest	1.89 mg/L	
Benzene	4/26/2011	WGR Southwest	ND < 2.0 µg/L	
Toluene	4/26/2011	WGR Southwest	ND < 2.0 µg/L	
Ethylbenzene	4/26/2011	WGR Southwest	ND < 2.0 µg/L	
Xylenes, total	4/26/2011	WGR Southwest	ND < 4.0 µg/L	
1,2,4-Trimethylbenzene	4/26/2011	WGR Southwest	4.4 µg/L	
1,3,5-Trimethylbenzene	4/26/2011	WGR Southwest	3.6 µg/L	
tert-Butanol	4/26/2011	WGR Southwest	87 µg/L	
Naphthalene	4/26/2011	WGR Southwest	ND < 5.0 µg/L	
Mercury	4/26/2011	WGR Southwest	ND < 0.00020 mg/L	
Antimony	4/26/2011	WGR Southwest	ND < 0.010 mg/L	
Arsenic	4/26/2011	WGR Southwest	0.083 mg/L	
Barium	4/26/2011	WGR Southwest	0.012 mg/L	
Beryllium	4/26/2011	WGR Southwest	ND < 0.0040 mg/L	
Cadmium	4/26/2011	WGR Southwest	ND < 0.0050 mg/L	
Chromium	4/26/2011	WGR Southwest	ND < 0.0050 mg/L	
Cobalt	4/26/2011	WGR Southwest	ND < 0.010 mg/L	
Copper	4/26/2011	WGR Southwest	ND < 0.010 mg/L	
Lead	4/26/2011	WGR Southwest	ND < 0.0050 mg/L	
Molybdenum	4/26/2011	WGR Southwest	0.043 mg/L	
Nickel	4/26/2011	WGR Southwest	ND < 0.010 mg/L	
Selenium	4/26/2011	WGR Southwest	0.011 mg/L	
Silver	4/26/2011	WGR Southwest	ND < 0.010 mg/L	
Thallium	4/26/2011	WGR Southwest	ND < 0.010 mg/L	
Vanadium	4/26/2011	WGR Southwest	0.012 mg/L	
Zinc	4/26/2011	WGR Southwest	0.090 mg/L	

mg/L = milligrams per Liter
µg/L = micrograms per Liter
Eight samples collected from Baker Tanks located at Collection Area.

Table 2-3: Contaminants of Concern – Previous Investigations (Matrix = Crude oil[1])

Analytical Parameter (Contaminants of Concern)	Date of sampling	Sampling contractor	Weathered Crude Oil Laboratory Analytical Results[1] (units)	Non-weathered Crude Oil Laboratory Analytical Results[1] (units)
TPH gasoline (C4-C12)	8/30/11	WGR Southwest	29,000 mg/kg	110,000 mg/kg
TPH diesel (C13-C28)	8/30/11	WGR Southwest	379,000 mg/kg	376,000 mg/kg
TPH oil (C29-C40)	8/30/11	WGR Southwest	60,000 mg/kg	78,000 mg/kg
Benzene	8/30/11	WGR Southwest	ND <0.95 mg/kg	200 mg/kg
Toluene	8/30/11	WGR Southwest	ND <0.95 mg/kg	610 mg/kg
Ethylbenzene	8/30/11	WGR Southwest	8.7 mg/kg	320 mg/kg
Xylenes, total	8/30/11	WGR Southwest	52 mg/kg	1,200 mg/kg
Naphthalene	8/30/11	WGR Southwest	23 mg/kg	120 mg/kg
1,2,4-Trimethylbenzene	4/26/2011	WGR Southwest	77 mg/kg	540 mg/kg
1,3,5-Trimethylbenzene	4/26/2011	WGR Southwest	21 mg/kg	130 mg/kg
tert-Butanol	4/26/2011	WGR Southwest	ND < 48 mg/kg	ND <120 mg/kg
Mercury	8/30/11	WGR Southwest	ND < 0.020 mg/kg	ND < 0.020 mg/kg
Antimony	8/30/11	WGR Southwest	ND < 9.9 mg/kg	ND < 10 mg/kg
Arsenic	8/30/11	WGR Southwest	ND < 2.0 mg/kg	ND < 2.0 mg/kg
Barium	8/30/11	WGR Southwest	ND <0.99 mg/kg	2.7 mg/kg
Beryllium	8/30/11	WGR Southwest	ND < 0.50 mg/kg	ND < 0.50 mg/kg
Cadmium	8/30/11	WGR Southwest	ND < 0.50 mg/kg	ND < 0.50 mg/kg
Chromium	8/30/11	WGR Southwest	ND < 0.99 mg/kg	ND < 1.0 mg/kg
Cobalt	8/30/11	WGR Southwest	ND < 0.99 mg/kg	ND < 1.0 mg/kg
Copper	8/30/11	WGR Southwest	ND < 2.0 mg/kg	ND < 2.0 mg/kg
Lead	8/30/11	WGR Southwest	ND < 2.0 mg/kg	ND < 2.0 mg/kg
Molybdenum	8/30/11	WGR Southwest	ND < 2.0 mg/kg	ND < 2.0 mg/kg
Nickel	8/30/11	WGR Southwest	20 mg/kg	8.3 mg/kg
Selenium	8/30/11	WGR Southwest	ND < 2.0 mg/kg	ND < 2.0 mg/kg
Silver	8/30/11	WGR Southwest	ND < 0.99 mg/kg	ND < 1.0 mg/kg
Thallium	8/30/11	WGR Southwest	ND < 9.9 mg/kg	ND < 10 mg/kg
Vanadium	8/30/11	WGR Southwest	16 mg/kg	11 mg/kg
Zinc	8/30/11	WGR Southwest	ND < 5.0 mg/kg	ND < 5.0 mg/kg
Benzo(a)pyrene	8/30/11	WGR Southwest	32 mg/kg	16 mg/kg

Chrysene	8/30/11	WGR Southwest	ND < 0.045 mg/kg	17 mg/kg
Fluoranthene	8/30/11	WGR Southwest	18 mg/kg	19 mg/kg
Fluorene	8/30/11	WGR Southwest	ND < 0.045 mg/kg	48 mg/kg
Naphthalene	8/30/11	WGR Southwest	63 mg/kg	180 mg/kg
Phenanthrene	8/30/11	WGR Southwest	60 mg/kg	110 mg/kg

mg/kg = milligrams per kilogram
1 – Crude oil samples collected from Baker Tank located at Shell Lubes Plant and directly from Youngstown Lateral Pipeline.

Table 5-1: Analytical Method, Containers, Preservation, and Holding Times Requirements
Matrix = Soil

Analytical Parameter and/or Field Measurements	Analytical Method Number	Containers (number, type, size/volume)	Preservation Requirements (chemical, temperature, light protection)	Maximum Holding Times
Volatile Organics by GC/MS	EPA 8260B	3 x 5g Encore OR 3 x Terracore OR 1 x brass sleeve	Frozen within 48 hours	14 days
Semi-Volatile Organics	EPA 8270C	1 x brass sleeve OR 1 x 8 oz jar	Cool to 4 degrees C	14 days
DRO/ORO/EFH	EPA 8015B	1 x brass sleeve OR 1 x 8 oz jar	Cool to 4 degrees C	14 days
Total Metals	EPA 6020B	1 x brass sleeve OR 1 x 4 oz jar	Cool to 4 degrees C	180 days

Table 5-2: Analytical Method, Containers, Preservation, and Holding Times Requirements
Matrix = Water/Blanks

Analytical Parameter and/or Field Measurements	Analytical Method Number	Containers (number, type, size/volume)	Preservation Requirements (chemical, temperature, light protection)	Maximum Holding Times
Volatile Organics by GC/MS	EPA 8260B	3 x 40 mL VOA	Cool to 4 degrees C HCl	14 days
Semi-Volatile Organics	EPA 8270C	2 x 1L amber	Cool to 4 degrees C	7 days
DRO/ORO/EFH	EPA 8015B	2 x 1L amber	Cool to 4 degrees C	7 days

Table 5-3
Data Validation and Acceptance Criteria
Quality Assurance Project Plan

Data Validation Parameter	Acceptance Criteria	Guidelines for Corrective Action
Holding Time	Each sample should meet holding times. Holding times for VOCs are presented in the SAP.	Analytical results flagged as estimated concentrations (J) or as estimated quantitation limits (UJ). A slight exceedance may not be qualified at the discretion of the data validator.
Trip Blanks	Contaminants are not present in the blanks.	Flag values as estimated (J) if less than 10X for method specific laboratory contaminants and 5X for other contaminants. Request that laboratory review data. Carefully consider type of blank, compounds present, and origin of contaminants. Modify sampling procedures or laboratory SOPs.
Field Duplicates	RPD for water = 25%, for solids = 50%.	Field duplicate exceeds RPD criteria. Review sampling procedures and request that laboratory review data.
Practical Quantitation Limits	Positive results are above the lowest practical quantitation limit. If dilution is required as a result of matrix interference, the practical quantitation limits will be adjusted by the laboratory and the lowest practical quantitation limits may not be achievable.	Concentrations reported below the practical quantitation limit will be flagged as estimated (J). Review sensitivity data and discuss specific results with testing laboratory in a qualitative manner to determine if re-analysis or modification of procedures should be performed to meet desired objectives.

Table 5-3
Data Validation and Acceptance Criteria
Quality Assurance Project Plan

Data Validation Parameter	Acceptance Criteria	Guidelines for Corrective Action
Matrix Spike/Matrix Spike Duplicate	RPD for water = 25%, for solids = 50%. Spike recoveries for water = 70% - 130% (requested); 50%-150%(maximum) Spike recoveries for solids = 60% - 140% (requested); 50%-150% (maximum)	Re-analyze MS/MSD to verify recovery problem is due to matrix interference. Data are not qualified based on MS/MSD results alone. Verify that the associated LCS is within QC limits.
Surrogates	RPD for water = 25%, for solids = 50%. 8260B surrogate recoveries for water = 70% - 130% 8260B surrogate recoveries for solids = 60% - 140% 8270C surrogate recoveries for water = 70% - 130%(requested); 60%-140% (maximum) 8270C surrogate recoveries for soilds = 60% - 140%	Samples with surrogate recoveries below QC limits will be flagged as estimated (J) for detected results and (UJ) for nondetects. Samples with surrogate recoveries above QC limits will be flagged as estimated (J) for detected results. Nondetects will not be qualified. In all cases, qualification of the data is at the discretion of the data validator, i.e., where dilutions are involved, the validator may determine that data qualifications are not necessary.
Laboratory Control Sample	RPD for water = 25%, for solids = 50%. 8260B LCSrecoveries for water = 75% - 125% 8260B LCS recoveries for solids = 70% - 130% 8270C LCS recoveries for water = 70% - 130% (requested); 60%-140%(maximum) 8270C LCS recoveries for soilds = 60% - 140%	Review data and discuss with laboratory. Re-analysis may be necessary. Data qualifications may be necessary at the discretion of the data validator.
Initial Calibration	Organics - % RSD is less than 30 for calibration check compounds and less than 15 for other analytes.	Laboratory should recalibrate instrument. Samples run on ICAL which is out of QC limits are qualified as estimated (J) for detected results and (UJ) for nondetects.

Table 5-3
Data Validation and Acceptance Criteria
Quality Assurance Project Plan

Data Validation Parameter	Acceptance Criteria	Guidelines for Corrective Action
Continuing Calibration Verification	Organics - % D is less than 20% for calibration check compounds.	Calibration standard should be re-injected. A new calibration curve should be run if re-injection fails. Analyses associated with the CCAL will be qualified as estimated (J) for detected results and (UJ) for nondetects.
General Quality of Data	Completeness of data should range between 90 and 100 percent complete.	Review completeness data and discuss results with testing laboratory in a qualitative manner to determine if re-analysis or modification of procedures should be performed to meet desired objectives.

Note: Table 2 is to be used for data validation for each validation point, where applicable. Specific determinations of data validity should be based on review of the data and circumstances associated with the samples tested and guidance regarding data validation.

<u>Data Validation Qualifiers</u>

U	The analyte was analyzed for, but not detected above the reported sample quantitation limit.
J	The analyte was positively identified; the associated numerical value is an estimated quantity.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a 'tentative identification.'
NJ	The analysis indicates the presence of an analyte that has been 'tentatively identified' and the associated numerical value is an estimated quantity.
UJ	The analyte was not detected above the reported sample quantitation limit. The associated quantitation limit is estimated.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Table 5-4
Laboratory MDLs and RLs
Quality Assurance Project Plan

Target Analyte	Waters		Soils	
	RL mg/L	MDL mg/L	RL mg/Kg	MDL mg/Kg
Benzene	0.005	0.001	0.005	0.001
Toluene	0.005	0.0025	0.005	0.0025
Ethylbenzene	0.005	0.0025	0.005	0.0025
Xylenes, Total	0.005	0.0031	0.005	0.0025
Biochemical Oxygen Demand	5	2.0	n/a	n/a
Chemical Oxygen Demand	10	7.8	n/a	n/a
Nitrate	0.1	0.05	5	2.5
Sulfate	5	2.5	50	25
Acenaphthene	0.001	0.0005	0.025	0.012
Acenaphthylene	0.001	0.0005	0.025	0.012
Anthracene	0.0001	0.00005	0.025	0.012
Benz[a]anthracene	0.0001	0.00005	0.025	0.012
Benzo[a]pyrene	0.0001	0.00005	0.025	0.012
Benzo[b]fluoranthene	0.0001	0.00005	0.025	0.012
Benzo[k]fluoranthene	0.0001	0.00005	0.025	0.012
Benzo[g,h,i]perylene	0.0001	0.00005	0.025	0.012
Chrysene	0.0005	0.00025	0.025	0.012
Dibenz[a,h]anthracene	0.0001	0.00005	0.025	0.012
Fluoranthene	0.001	0.0005	0.025	0.012
Fluorene	0.001	0.0005	0.025	0.012
Indeno[1,2,3-cd]pyrene	0.0001	0.00005	0.025	0.012
2-Methylnaphthalene	0.001	0.0005	0.025	0.012
Naphthalene	0.001	0.0005	0.025	0.012
Phenanthrene	0.001	0.0005	0.025	0.012
Pyrene	0.001	0.0005	0.025	0.012

Notes:
RL: Reporting Limit
MDL: Method Detection Limit

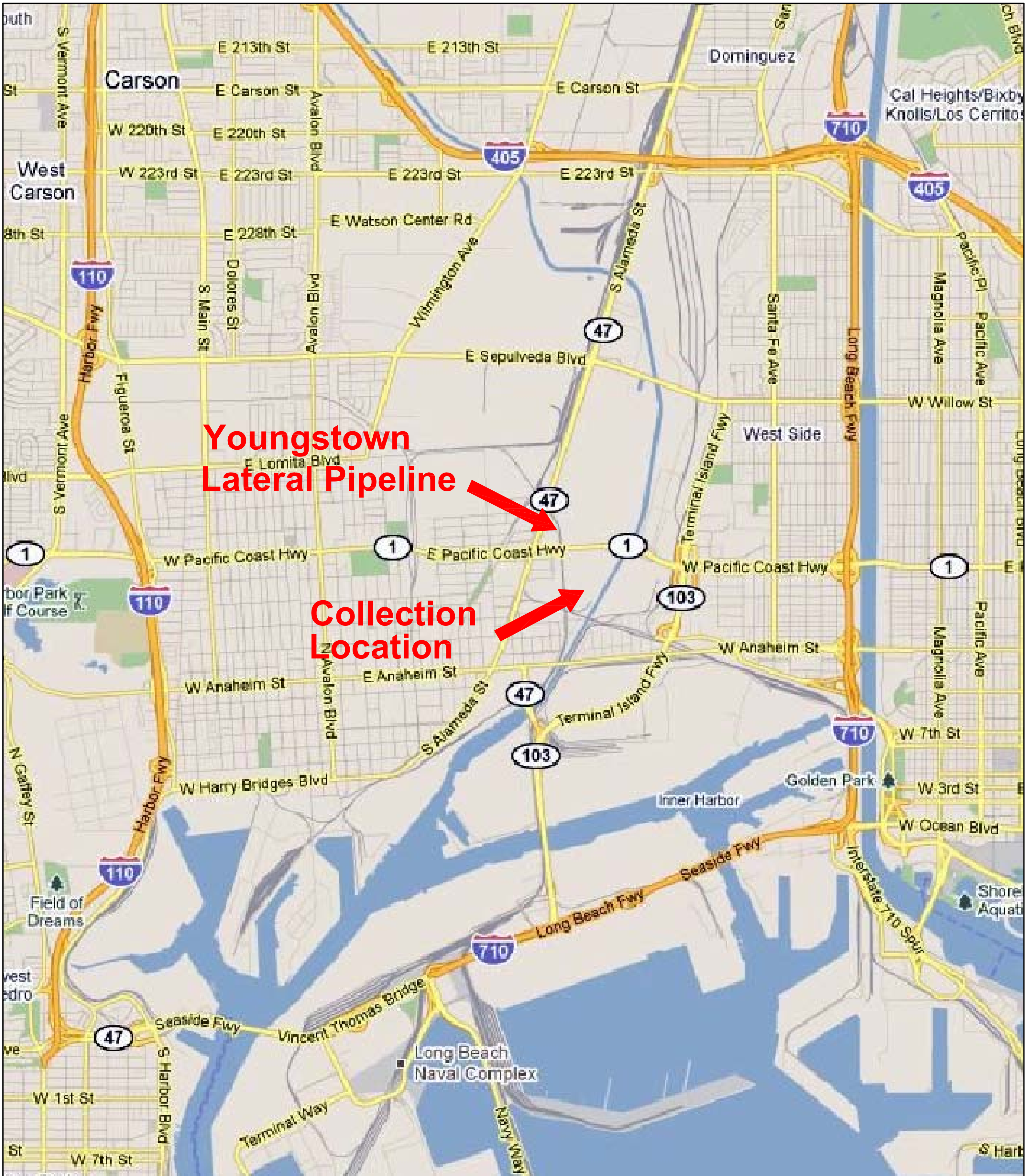
Table 6-1: Field and Sampling Equipment

Description of Equipment	Media (if applicable)	Dedicated (Yes/No)
Hand Auger (quick disconnect rods with 2 to 4 inch soil bailers)	SOIL	NO
Hand Spades and Shovels	SOIL	NO
Pick Axe/Pry Bar	SOIL	NO
5 Gallon Buckets	SOIL	NO
Cleaning Brushes	SOIL	NO
General Health and Safety Equipment	SOIL	NO
Sample Bottles (4 to 8 ounce glass jar)	SOIL	YES
Core Samplers	SOIL	NO
Ice Chilled Cooler	SOIL	NO
PID (photo-ionization detector) (calibrated to 100 ppmv span gas)	SOIL	NO
Hand Held GPS (Global Positioning Satellite) Unit	SOIL	NO
Decontamination Supplies	WATER	NO
Sample Bottleware (VOAs and amber glass bottles)	WATER	YES

Table 6-2: Field Equipment/Instrument Calibration, Maintenance, Testing and Inspection

Analytical Activities	Field Equipment/ Instrument	Calibration Activity	Maintenance & Testing/Inspection Activity	Frequency	Acceptance Criteria	Corrective Action
Air Monitoring During Soil Investigation	4 Gas Meter	As Required by Manufacturer	As Required by Manufacturer	Pre-Field/Daily	+/- 10% of Calibration Span Gas	If Outside of Acceptance Criteria, Recalibrate or Replace Instrument

FIGURES



North

Scale: 1" = 0.75 miles

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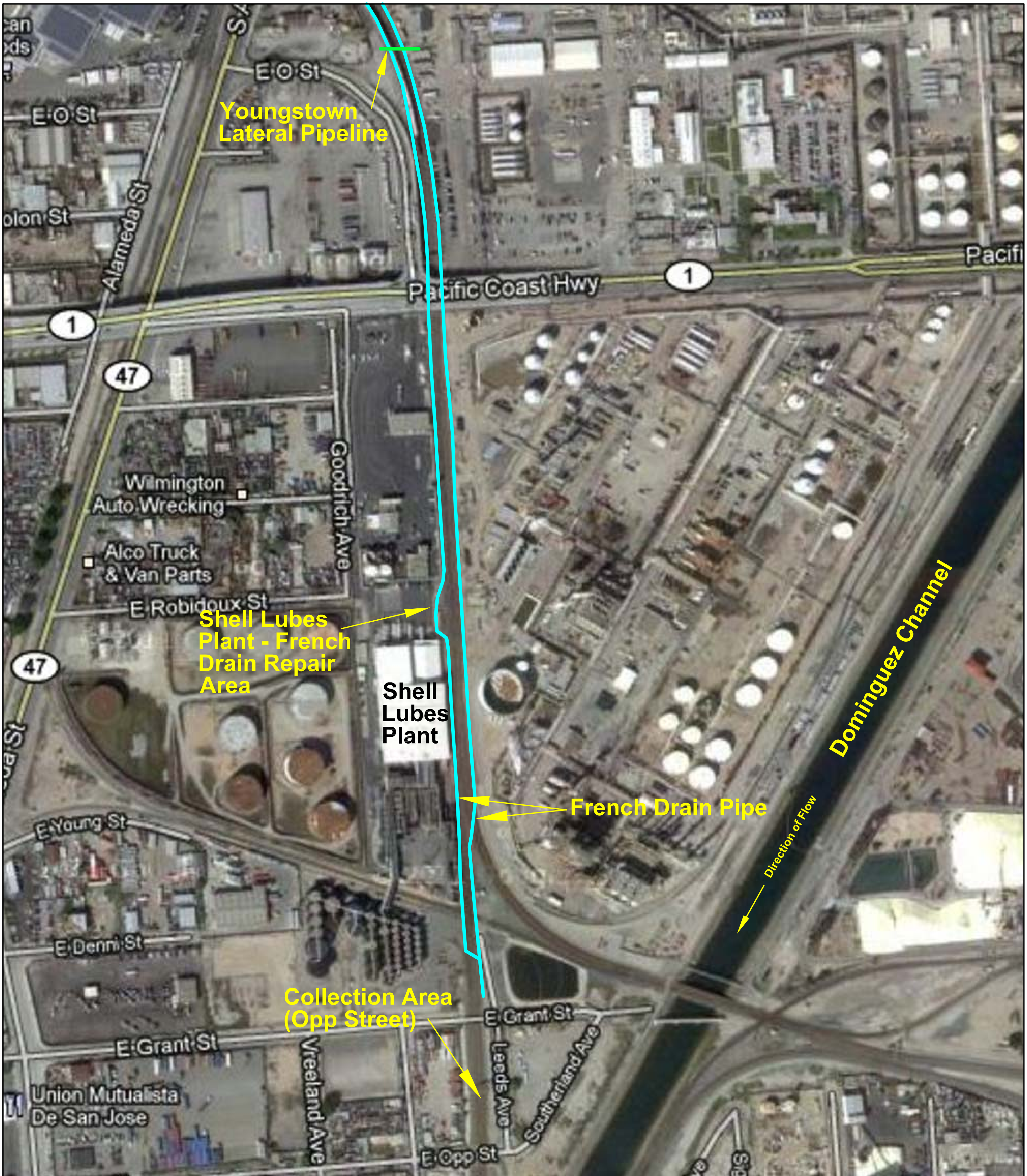
#	Revision Description	Date

Beacon Energy Services
2685 Temple Ave., Signal Hill, CA 90755, (562) 997-3087

Created by: VM | Date: 4/11/2011

Client: **Crimson Pipeline, L.P.**
Dominguez Spill

Figure No.: Figure 1 - Vicinity Map



North

Scale: 1" = 300'

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#	Revision Description	Date

Beacon Energy Services
2685 Temple Ave., Signal Hill, CA 90755, (562) 997-3087

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Client: **Crimson Pipeline, L.P.**
Dominguez Spill

Figure No.: Figure 2 - Sample Areas

ATTACHMENT A

1.0 PURPOSE & APPLICABILITY

The purpose of this document is to define the standard operating procedure (SOP) for collecting soil samples when drilling with hollow-stem augers, direct push, and hand auger methods. The ultimate goal of the sampling program is to obtain samples that meet acceptable standards of accuracy, precision, comparability, representativeness, and completeness. All steps that could affect tracking, documentation, or integrity of samples have been explained in sufficient detail to allow different sampling personnel to collect samples that are equally reliable and consistent.

This procedure provides descriptions of equipment, field procedures, sample containers, decontamination, documentation, decontamination, storage, holding times, and field quality assurance (QA) and quality control (QC) procedures necessary to collect soil samples.

While the Project Quality Assurance Project Plan (QAPP) is intended to be strictly followed, it must be recognized that field conditions may force some modifications to the SOP. Any modification to the procedure shall be approved by the Project Manager or Task Leader in advance. Where SOP modification is planned sufficiently in advance, regulatory agency concurrence will be sought prior to conducting the specific activity. When direct contact with regulatory agency staff is not possible, or unscheduled delays will result, such as during field activities, regulatory agency will be notified of deviations from the SOPs, in writing, as soon as possible after the occurrence.

2.0 DEFINITIONS

HASP	Health and Safety Plan
OSHA	Occupational Safety and Health Administration
PID	Photoionization Detector
PPE	Personal Protective Equipment
PVC	Polyvinyl Chloride
QA	Quality Assurance
QC	Quality Control
QAPP	Quality Assurance Project Plan
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
USCS	Unified Soil Classification System
VOA	Volatile Organic Analysis
VOCs	Volatile Organic Compounds

3.0 HEALTH AND SAFETY CONSIDERATIONS

Refer to the site-specific Health and Safety Plan (HASP) for health and safety considerations applicable to soil sampling.

Many hazards should be considered during the soil sampling activities, careful consideration of these hazards by the project team is essential. Some of the hazards include the following:

- Proper utility clearance must be performed in accordance with the Pre-Drilling/Excavation Checklist and Utility Clearance Log. There must be a minimum clearance of five (5) feet in addition to the diameter of the drilling augers. Client-specific requirements may be more restrictive.

- Traffic control may be required depending on the proximity of soil sampling activities to the roadway. Traffic control plans should be carefully evaluated to adequately delineate the work zone and provide the necessary safety factors.

- Personal protective equipment (PPE) including hard hats, high visibility traffic vest, gloves, hip boots or chest waders and other appropriate clothing;

- Heat and cold stress;

- Biological hazards such as insects and spiders. Appropriate clothing is required such as long-sleeved shirts and long pants.

- Bloodborne pathogens. Some of our sites may have syringes and other drug paraphernalia that must be carefully avoided.

- Chemical exposure on sites with open contamination. Respiratory protection may be necessary. Proper selection of respiratory protection is essential and an understanding of its limitation (i.e., negative pressure respiratory protection does not supply oxygen in an oxygen-deficient atmosphere). Staff should familiarize themselves with exposure limits for contaminants of concern.

- Use of air monitoring instrumentation will likely be necessary. We must be careful to make sure that our instrumentation is appropriate for the airborne contaminants of interest and that our staff understands the limitations of the instrumentation. Staff must also understand and perform calibration including zeroing with zero gas cylinders and appropriate other calibration gases.

- Decontamination of equipment and personnel must be properly designed and constructed to be sure that contamination is kept within the boundaries of the exclusion zone;

- Noise and proper use of hearing protection devices such as ear plugs and muffs.

- Emergency action plan must be carefully coordinated in advance between Stantec, our subcontractors, the client, and emergency responders.

All of these risks and others must be discussed with our subcontractors and clients to be sure they are properly addressed. Once the issues have been addressed at a project management level, they must be communicated to the staff that will actually perform the work. Details of procedures, instrument measurements and calibration, and other activities must be recorded in the field log and/or on data collection forms.

4.0 QUALITY ASSURANCE PLANNING CONSIDERATIONS

Soil sampling shall be done by personnel familiar with the common sources of random and systematic error so appropriate decisions can be made in the field. Some of the common phenomena which may degrade the sample quality collected from the well point are listed below.

- **Volatilization.** Volatilization occurs when the sample is in contact with air for an extended time. Typically volatilization occurs if the sample undergoes excessive disturbance during sampling or if air pockets exist at the top of the container. Limiting disturbance during sampling, filling sample containers in order of volatility, and tight capping of bottles immediately after filling will minimize these errors.

- **Adsorption/desorption.** This is the gain or loss of chemicals through exchange across surfaces. Adsorption may occur when the sample comes in contact with large surface areas such as the sampling container. Thorough decontamination of sample collection containers/monitoring equipment probes along with expedient transfer from the sample container to the labrotory container minimizes sorption effects.

- **Chemical reaction.** Dissolved chemical constituents may change due to reactions such as oxidation, hydrolysis, precipitation, etc. Proper preservation and adherence to holding times minimize these reactions.

- **Sample contamination.** Sample contamination is the most common source of errors and can result from several factors, including incomplete decontamination, contact with other samples, and contact with the atmosphere. Careful attention to decontamination, handling, and container sealing minimizes sample contamination.

5.0 RESPONSIBILITIES

The Project Manager or Task Leader will be responsible for assigning project staff to complete soil sampling activities. The Task Leader will also be responsible for assuring that this and any other appropriate procedures are followed by all project personnel.

The project staff assigned to the well point installation and sediment pore water sampling will be responsible for completing their tasks according to this and other appropriate procedures. All staff will be responsible for reporting deviations from the procedure or nonconformance to the Task Leader, Project Manager or Project QA/QC Officer.

6.0 TRAINING AND QUALIFICATIONS

Only qualified personnel shall be allowed to perform this procedure. At a minimum, Stantec employees qualified to perform soil sampling will be required to have:

- Read this SOP.

- Read project-specific QAPP.
- Indicated to the Task Leader that all procedures contained in this SOP are understood.
- Completed the Occupational Safety and Health Administration (OSHA) 40-hour training course, and/or annual 8-hour refresher course, as appropriate.
- Coordinated any proposed sampling activites with the laboratory to ensure proper sampling procedures.
- Previously performed soil sampling activities generally consistent with those described in this SOP.

Stantec employees who do not have previous experience with soil sampling will be trained on site by a qualified Stantec employee, and will be supervised directly by that employee until they have demonstrated an ability to perform the procedures.

7.0 REQUIRED MATERIALS

The following is a typical list of equipment that may be needed to perform soil sampling:

- Auger rig or direct-push unit with appropriate equipment for sampling, or hand auger.
- Continuous soil sampler (2-½-inch x 18-inch or 2-foot split-spoon sample tube) or direct-push clear acetate or polyvinyl chloride PVC tube (typically 4-foot long).
- Photoionization detector (PID) or other air monitoring instrumentation as required by the HASP.
- 4-mil-thick plastic sheeting or aluminum foil.
- Tape measure.
- Unified Soil Classification System (USCS) based on the Visual-Manual Procedures in ASTM Standards D 2487-00 and D 2488-00.
- 5035 sample containers with lids.
- Terra-cores™ or similar coring sampling device, if required.
- Sample labels.
- Stainless steel trowels, putty knives or similar soil working tool.
- Penetrometer (if available).
- Waterproof marking pens, such as the Staedtler Lumocolor.
- Coolers (with ice) for sample storage and shipment.

- Sample data forms/clip board.
- Decontamination supplies (Alconox™ [or similar detergent], brush, bucket).
- Nitrile gloves, or other specified chemical resistant gloves.
- Work gloves.
- Camera and film or disks.
- Blank soil borehole logs or a field-logging PDA.
- Personal safety gear (hard hat, steel-toed boots, ear plugs, safety glasses, etc.).

8.0 METHODS

8.1 Hollow-Stem Auger/Direct Push Sampling

Make sure that all equipment and meters have been calibrated to the equipment specifications and the results have been recorded in the field log.

The top five (5) feet of the boreholes will be cleared via air knife, vacuum excavation, ground penetrating radar, hand auger, tile probe or some combination of these methods.

Shallow soil boreholes are typically drilled with hollow-stem augers or geoprobe and sampled at the intervals specified in the work plans. Sampling shall be done in advance of the lead auger to minimize cross-contamination. Samples for laboratory analysis shall be taken with a continuous soil sampler. Standard blow counts shall be recorded for driving the sampler 6 and 12 inches (ASTM Method D 1586-99) if sampler is hammer driven.

Upon retrieval of the sample, the sample will placed on a clean surface (or lined with disposable aluminum foil or plastic sheeting) and will be screened with a PID for locating potential elevated PID readings. If applicable, a representative grab sample will be collected along with a headspace sample and placed into the appropriately labeled sample container. The sample containers shall be placed in self-sealing plastic or bubble bags in a cooler with ice or frozen ice packs for storage until they are delivered to the analytical laboratory.

The following method is to be used for headspace screening:

- The portion (for headspace screening) should be placed into an appropriately sized re-sealable Ziploc® or equivalent bag;
- Seal and label the bag with the borehole identification and the depth of the sample;
- Allow the bag to equilibrate for approximately ten (10) minutes; and
- Insert the probe tip of the PID into the bag. Obtain a measurement using the PID.

The remainder of the sample shall be logged in accordance with the USCS and recorded on the boring logs according to the following procedure:

1. As much information as possible is to be shown in the heading of each log. This includes, but is not limited to:

   - Project name and project identification number;
   - Identification of borehole;
   - Name of drilling company;
   - Make, model, type, and size of drilling and sampling equipment used;
   - Date and time of start and end of drilling
   - Name of geologist(s) logging boring;
   - End of boring depth; and,
   - Depth to water (if encountered).

2. Each log is to begin with a description of the surface, (i.e., native, paved with asphalt, paved with concrete, and such). If any concrete is cut to open the hole, the thickness will be noted.

3. Every foot will be accounted for, with no gaps. If an interval is not sampled it will be noted. If an attempt is made to sample an interval, but there is no recovery, it will be noted.

4. Complete construction details are to be detailed for each well on a standard well construction form. Construction details should include:

   - A description of the type and length of casing i.e., 20' of 2" inner diameter (ID) Schedule 40 PVC casing;
   - Length and depths of the top and bottom of the screened interval;
   - Screen slot size;
   - Depths of the top and bottom of the filter pack;
   - Filter pack materials and sand size;
   - Depths and types of bentonite seals;
   - Detail of the use of grout; and,
   - Detail of the surface completion (i.e., stick up, flush-mounted).

5. The number of bags of sand, bentonite, and grout used will be counted. These numbers will be compared daily with the driller's daily report.

Soil cuttings will be stockpiled on 4-mil thick plastic sheeting or drummed. The cuttings and other investigation-derived waste will be managed in accordance with the work plan or client-specific directives.

When sampling for volatile organic compounds (VOCs), use USEPA Method 5035. Method 5035 requires ample preservation in the field at the point of collection. The preservative used for the low concentration soil method (0.5 to 200 µg/kg) is sodium bisulfate and the preservative used for the medium/high concentration soil method (>200 µg/kg) is methanol. This field collection and preservation procedure is intended to prevent loss of VOCs during sample transport, handling, and analysis. The holding time for VOC analysis is 14 days.

1. Use the lab provided plunger style sampler (T-handle, syringe with tool, or terra-core™ sampler) to collect a 5g soil sample.

2. Unscrew the lid of the lab provided pre-preserved sodium bisulfate volatile organic analysis (VOA) vials and inject the 5g soil sample.

3. Tightly seal the VOA vial.

4. Repeat this step with the second sodium bisulfate VOA vial.

5. Then, repeat with the methanol preserved VOA vial.

6. Collect a soil sample in the 4-ounce wide mouth glass jar provided by the lab.

7. Make sure sample containers are labeled and bagged in plastic or bubble bags.

8. Ice the samples.

8.2 Hand Auger Sampling

Shallow soil boreholes less than five (5) feet in depth can be collected using a hand auger. The auger will be advanced until the desired sampling depth is reached. The auger will be removed from the boring, the sample will be extracted from the hand auger and field screened (as appropriate), and representative grab samples will be collected and placed into the appropriate labeled sample container. Decontamination of the auger and extensions will occur after each sample.

Boreholes will be abandoned by backfilling with bentonite chips and hydrating with potable water.

8.3 Excavation

Excavations and test pits will be excavated using a backhoe provided by the subcontractor. The dimensions of individual excavations will vary depending on the strength and stability of the trench walls and the specific purpose of the trench. Excavations greater than four (4) feet deep will not be entered by any personnel unless shoring is performed or the sides are stepped back to the proper angle per OSHA requirements.

When starting an excavation, the backhoe operator will first remove the topsoil or cover (if any) and place it in a discrete mound at least five (5) feet from the edge of the excavation. The excavation will be continued in approximately 6-inch cuts with the backhoe using a horizontal scraping motion rather than a vertical scooping motion. If a visibly-stained or otherwise chemically-affected soil interval is encountered, the affected excavated soils will be placed on 4-mil thick plastic sheeting.

8.3.1 Excavation Sampling

Samples will be collected from the backhoe bucket using a stainless steel trowel or similar. The top layer of soil will be removed prior to collecting the sample. The soil will then be placed in the appropriately labeled sample container and placed inside a chilled cooler.

8.3.2 Excavation Backfilling

The soils will be replaced in the excavation at their original depths to the extent practicable so that the soil from the bottom of the trench will be placed on the bottom, and the topsoil will be replaced on the top. The backhoe will be used to backfill and compact the excavation.

Upon completion and subsequent backfilling of each excavation, four corners will be marked with a wooden stake for surveying. If appropriate, a fifth stake will be placed above the location where a soil sample was collected. The points may be surveyed, as needed.

8.4 Decontamination Methods

8.4.1 Sampling Equipment Decontamination

The following steps will be used to decontaminate sampling equipment:

- Ensure that the decontamination process has been carefully designed to be sure that the solutions used are appropriate for the chemicals of interest.
- Ensure that the decontamination area is properly constructed to keep contamination within the contamination reduction and exclusion zones.
- Ensure that the decontamination area is properly constructed to contain the rinse solutions and solids.
- Personnel will dress in suitable safety equipment to reduce personal exposure.
- Smaller equipment that will not be damaged by water will be placed in a wash bucket containing an Alconox™ (or equivalent) solution and scrubbed with a brush or clean cloth. Smaller equipment will be rinsed in water. Change rinse and detergent waters between boreholes, as needed.
- For larger drilling equipment the soil and/or other material will be scraped off with a flat-bladed scraper, and placed within a deconcontamination (decon) pad. The decon pad will be constructed in a predetermined location, and equipment shall be cleaned with a pressure washer using potable water. Care will be taken to adequately clean the insides of the hollow-stem augers, and cutter heads.
- Equipment that may be damaged by water will be carefully wiped clean using a

sponge and detergent water and rinsed in or wiped down with distilled water. Care will be taken to prevent any equipment damage.

Following decontamination, equipment will be placed in a clean area or on clean plastic sheeting to prevent contact with potentially contaminated soil.

Following decontamination, drilling equipment will be placed on the clean drill rig and moved to a clean area. If the equipment is not used immediately, it will be stored in the designated secure, clean area.

8.4.2 Excavation Decontamination

Decontamination protocols must be carefully designed and constructed to deal with the chemicals of interest and ensure that the rinse solutions and solids are contained within the contamination reduction zone.

The backhoe bucket will be decontaminated prior to excavating each excavation. The entire backhoe, bucket, and tires will be decontaminated at the conclusion of the trenching operation. Decontamination will involve using a steam cleaner with an Alconox™ solution or pressure washer and rinsing using a steam cleaner or pressure washer with potable water. Backhoe decontamination will take place at the decontamination area located adjacent to the maintenance building or at another appropriate location.

The sampling equipment will be decontaminated prior to collecting each sample. Decontamination will consist of washing the equipment with a scrub brush in a bucket with an Alconox™ solution (or equivalent) and rinsing the equipment in a bucket filled with tap water. The date and time of decontamination of the backhoe and sampling equipment will be recorded in the field book and/or data collection forms.

8.5 Sample Containers, Storage, and Holding Times

Refer to the Project Sampling and Analysis Plan (SAP) for project specific instructions on proper containers, storage of samples and allowable holding times.

9.0 QUALITY CONTROL CHECKS AND ACCEPTANCE CRITERIA

Refer to the QAPP and SAP for specific quality control checks and acceptance criteria.

10.0 DOCUMENTATION

A borehole log will be completed for each hollow-stem auger or direct-push borehole. The field notebook and/or data collection forms will contain the following information:

- Project name and number.
- Drilling company's name.
- Date drilling started and finished.
- Type of auger and size (ID & OD).

- Type of equipment for air monitoring (PID or FID).
- Air monitoring calibration and measurements.
- Well completion and graphic log.
- Driller's name.
- Geologist's or engineer's name.
- Type of drill rig.
- Borehole number.
- Surface elevation (if available).
- Stratigraphic description with depth.
- Classification of the soils according to the USCS.
- Water levels and light non-aqueous phase liquid levels, if applicable.
- Drilling observations.
- Map of borehole or monitoring well location.

In addition, proper documentation will include observance of the chain of custody procedures as described in the Project QAPP and SAP.

Additional information regarding field documentation for borehole logging for fine- and coarse-grained soils and rocks are provided in Stantec checklists ERPA-603 through ERPA-605.

ACCEPTANCE

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Author/Originator

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Peer Reviewer

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Senior Reviewer

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Environment Practice QA/QC Manager

1.0 PURPOSE & APPLICABILITY

The purpose of this document is to define the standard operating procedure (SOP) for decontamination procedures. The ultimate goal of the decontamination procedure is to prevent cross-contamination between samples and sample areas and to protect workers from hazardous materials.

This procedure gives descriptions of equipment and field procedures necessary to perform decontamination.

This procedure may apply to all sampling by Stantec personnel or their subcontractors by the aforementioned sampling methods.

It must be recognized that field conditions may force some modifications to the SOP. Any modification to the procedure shall be approved by the Project Manager or Task Leader in advance and sufficiently documented so that the reason for the deviation can be clearly articulated to our clients and regulators, as necessary. Where SOP modification is planned sufficiently in advance, regulatory agency concurrence will be sought prior to conducting the specific activity.

2.0 DEFINITIONS

FSP	Field Sampling Plan
HASP	Health and Safety Plan
OSHA	Occupational Safety and Health Administration
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
SOP	Standard Operating Procedure
WP	(Project) Work Plan

3.0 HEALTH AND SAFETY CONSIDERATIONS

Consideration of Health and Safety risks prior to performing this work is paramount. This risk review may be performed by modifying a generic or an existing Job Safety Analysis in the HASP. Following is a short list of the items for consideration. Careful review of these items and other site-specific conditions by the project team is essential.

- Traffic guidance and control. Even plans developed by outside traffic control contractors need to be carefully evaluated to make sure they are protective of our staff and contractors.

- Personal protective equipment, including hard hats, high-visibility traffic vest, gloves, appropriate clothing.

- Heat and cold stress.

- Biological hazards such as insects and spiders. Appropriate clothing is required such as long-sleeved shirts and long pants.

- Bloodborne pathogens. Some of our sites may have syringes and other drug paraphernalia that must be carefully avoided.

- Chemical exposure on sites with open contamination. Respiratory protection may be necessary. Proper selection of respiratory protection is essential and an understanding of its limitation (i.e., negative pressure respiratory protection does not supply oxygen in an oxygen-deficient atmosphere). Staff should familiarize themselves with exposure limits for contaminants of concern.

- Use of air monitoring instrumentation will likely be necessary. We must be careful to make sure that our instrumentation is appropriate for the airborne contaminants of interest and that our staff understands the limitations of the instrumentation. Staff must also understand and perform calibration including zeroing with zero gas cylinders and appropriate other calibration gases.

- The exclusion and contaminant reduction zones must be properly designed and constructed so that contamination from decontamination activities of equipment and personnel is kept within this area.

- Noise and proper use of hearing protection devices such as ear plugs and muffs.

- Emergency action plan must be carefully coordinated in advance between Stantec, our subcontractors, the client, and emergency responders.

All of these risks and others must be discussed with our subcontractor and clients to be sure they are properly addressed. Once the issues have been addressed at a project management level, they must be communicated to the staff that will actually perform the work. Details of procedures, instrument measurements and calibration, and other activities must be recorded in the field log and/or on data collection forms.

4.0 RESPONSIBILITIES

The Project Manager or Task Leader will be responsible for assigning project staff to complete decontamination activities. The Task Leader will also be responsible for assuring that this and any other appropriate procedures are followed by all project personnel.

The project staff assigned to the decontamination tasks will be responsible for completing their tasks according to this and other appropriate procedures. All staff will be responsible for reporting deviations from the procedure or nonconformance to the Task Leader, Project Manager, or Project QA/QC Officer.

Only qualified personnel shall be allowed to perform this procedure. At a minimum, Stantec employees qualified to oversee decontamination will be required to have:

- Read this SOP;
- Read project-specific QAPP;
- Indicated to the Task Leader that all procedures contained in this SOP are understood;
- Completed the OSHA 40-hour training course and 8-hour refresher course, as appropriate; and,
- Previously performed decontamination activities generally consistent with those described in this SOP.

5.0 TRAINING/QUALIFICATIONS

Stantec employees who do not have previous experience with decontamination will be trained on site by a qualified Stantec employee, and will be supervised directly by that employee until they have demonstrated an ability to perform the procedures.

6.0 REQUIRED MATERIALS

The following is a typical list of equipment that may be needed to perform decontamination:

- Paper towels;
- Aluminum foil;
- Trash bags;
- Non-phosphate detergent (e.g., Alconox™);
- Distilled or deionized water (where available);
- Spray bottles;
- Cleaning brushes;
- 5-gallon buckets, purge tank, trailer, drums and drum labels or waste containers;
- Nitrile gloves, or other specified chemical resistant gloves;
- Work gloves; and,
- Personal protective equipment (hard hat, steel-toed boots, etc.).

7.0 DECONTAMINATION METHODS

Reusable field instrumentation and sampling equipment will be decontaminated prior to their first use, and between each well/sampling location in which they are used. Two types of decontamination procedures will be employed, depending on the level of visual or otherwise known contamination to which the instrumentation is exposed. Pre-use decontamination will follow the first decontamination protocol listed below.

Reusable instrumentation/equipment that has signs of visible NAPL or has potentially come in contact with NAPL-impacted material will be decontaminated in the following manner:

1. The instrumentation/equipment will be thoroughly rinsed with tap water to remove sediment and debris, after caked on material has been physically removed.

2. The instrumentation and sampling equipment will be thoroughly washed with a mixture comprised of approximately two (2) tablespoons of Alconox™ (or similar low phosphate cleaning agent) per 1-gallon of de-ionized water. A stiff bristle scrub brush will be used if necessary to provide thorough cleaning.

3. The instrumentation/equipment will be triple-rinsed with unused distilled or de-ionized water where available.

The effectiveness of the above decontamination procedures will be demonstrated through the periodic use of equipment blanks. A more detailed discussion of the proposed use of equipment blanks is provided in the FSP

Drill rigs or Geoprobes used on site will be thoroughly decontaminated prior to their arrival at the site and prior to initiation of any drilling activities. The rig and its equipment will be thoroughly examined to ensure that there are no significant fuel, hydraulic fluid, transmission oil, and/or motor oil leaks that could create a condition not previously in existence or exacerbate an existing condition.

Once the rig and its equipment have been thoroughly cleaned and inspected, subsequent decontamination efforts will focus only on those pieces of equipment which actually come into contact with soils or groundwater. No petroleum hydrocarbon based lubricants will be allowed on the drill stems or associated connections. Both the initial comprehensive cleaning of the rig and subsequent decontamination procedures will be performed using either steam-cleaning equipment or high pressure hot water/detergent wash. In addition, casing centralizers and casing handling equipment, if used, will be cleaned prior to use in the construction of monitoring wells.

Decontamination wash solutions and rinsate will be collected and containerized in 5-gallon buckets, 55-gallon drums, or poly tanks. The collected rinsate will be disposed of appropriately.

8.0 QUALITY CONTROL CHECKS AND ACCEPTANCE CRITERIA

Refer to the Quality Assurance Project Plan for specific quality control checks and acceptance criteria.

9.0 DOCUMENTATION

A record will be maintained during the purging procedure that will contain at a minimum:

- Project name and number;
- Date, personnel;
- Decontamination procedures;
- Volume of rinsate fluid generated during decontamination; and,
- Disposal method of decontamination water.

The data shall be recorded on a log form or in field logs.

ACCEPTANCE

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Author/Originator

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Peer Reviewer

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Senior Reviewer

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Environment Practice QA/QC Manager

1.0 PURPOSE & APPLICABILITY

Accurate and thorough documentation of field work conducted by Stantec is a vitally important component of project operations. Field notes, and the validity of the records kept in them, comprise a significant portion of Stantec's work product. Field notes represent legal records of our services and require a corresponding level of care and professionalism regardless of the grade of the field note taker.

Field notebooks should be complete in the field and serve as a primary source of information enabling a third-party to easily reconstruct the chronology of field events, even if applicable field forms (i.e., chain-of-custody forms) are lost or destroyed.

This Field Notebook Standard Operating Procedure (SOP) has been prepared as guidance for collecting and managing field notes, such that these records are collected in a consistent manner throughout Stantec.

2.0 DEFINITIONS

COC	Chain-of-Custody
FSP	Field Sampling Plan
HASP	Site-Specific Health and Safety Plan
O&M	Operation & Maintenance
PPE	Personal Protective Equipment
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
QAPP	Quality Assurance Project Plan
WP	(Project) Work Plan

3.0 HEALTH AND SAFETY CONSIDERATIONS

Field notes should be used as a medium to describe all activities occurring at a site when Stantec is present with or without subcontractors or other contractors on site. Field notes should reflect the following information, at a minimum, concerning site health and safety observations:

1. Ambient site conditions (i.e., operating facility versus barren land).

2. Weather.

3. Traffic patterns.

4. Tailgate/Toolbox safety meeting time, place, and reference for notes.

5. HASP location and use.

6. Specific Personal Protective Equipment (PPE) used on site.

7. Sampling activities, types of media sampled, areas and times.

8. Contractors, visitors, and client representatives on site.

4.0 QUALITY ASSURANCE PLANNING CONSIDERATIONS

Field notebooks should document the project quality assurance standards, referencing one or more of the following:

1. A project-specific FSP, QAPP, or combined SAP.
2. A project WP.
3. An O&M manual with written procedures.
4. An SOP for the specific tasks or task.
5. Forms or Checklists developed by a project team for a specific task.

The field notebook must not only record the daily quality assurance expectations for each task conducted but it should also reference the accepted standards of practice for both Stantec personnel and subcontractors in meeting these expectations.

5.0 RESPONSIBILITIES

With regard to field work documentation, the following are the minimum responsibilities for each position listed:

Project Manager – Responsible for:

- Ensuring project personnel performing field work understand the project quality assurance objectives and scope of work (i.e., SAP, QAPP, or WP and HASP).
- Managing resources (labor, equipment, materials, subcontractors) to be utilized, schedule, project number, project-specific field note requirements.
- Explaining expectations for communication with the home office (i.e., check-in phone calls, faxing field notes and forms).

Field Personnel – Responsible for:

- Reading and understanding project scope of work, schedule, and quality assurance documents prior to conducting field work.
- Maintaining copies of project documents, including the HASP.
- Diligently making routine entries in the field notebook concerning progress on site sampling activities, and deviations from the planned scope of work and activities of

Stantec, its subcontractors, or other contractors/visitors to the site, and any other information relevant to the work being conducted.

- Regular communication with the Project Manager throughout the day.

Health and Safety Officer – Responsible for:

- Periodic inspection of field notebooks for information relevant to potential site Health & Safety concerns, including use of PPE, monitoring instrument calibrations and use, and verification of training certificates from on-site personnel.

Project Quality Assurance Officer (if applicable) – Responsible for:

- Periodic inspection of field notebook(s) to ensure applicability of the field notebook for the project and the relevance of the notes collected.

- Management of field notebook in the field and project files in the home office following field work.

6.0 TRAINING/QUALIFICATIONS

Field personnel are expected to be experienced in the site-specific scope of work being performed through study and understanding of the project quality assurance standards prior to entering the field. While prior field experience on projects of similar scope and complexity is recommended, personnel maintaining the field notebook must record routine observations during field activities, and document non-routine events at the site in accordance with the project plans. Field personnel qualifications include legible penmanship, the ability to prepare clear illustrations and/or sketches of site features and activities, and the ability to responsibly manage field notebooks during and after field work.

7.0 REQUIRED MATERIALS

The following materials are required for proper field work documentation:

1. Field Notebook (e.g., Rite In The Rain, Composition, etc.) with numbered pages or Stantec field report forms.

2. Black or blue ink or indelible marking pen (e.g., Staedler Article No. 318-9 Lumocolor or equivalent).

3. Wrist watch or clock.

4. Project Quality Assurance documents or forms.

5. Mobile telephone or radio.

6. Communication log with pertinent contact information for key project (both Stantec and non-Stantec) personnel.

7. Site plan or map of area where work is to be conducted for reference purposes.

8.0 METHODS

The following protocol outlines a methodology to collect and manage field work documentation in a consistent manner throughout Stantec.

Multiple notebooks may be used for a project, perhaps concurrently, and the field note takers must coordinate with the Project Manager and Project Quality Assurance Officer (if applicable) to coordinate sequential numbering of field books.

1. Beginning of Project Day

The following entries should be made at the beginning of each project:

A. Note the project name, address and location, (i.e., off-site versus on-site, operable unit name, SWMU, etc.);

B. Note the governing documents including HASP, QAPP, WP, etc., for performing the work; and,

C. Note any specific activities planned for the day (e.g., drilling monitoring wells MW-1 through MW-4, removing a waste oil tank, completing a survey of sensitive habitat, or delineating a potential wetland, etc.).

2. Routine Events

The following entries should be made throughout each day, including:

A. Enter time (preferably at 15-minute increments) or starting and ending points (i.e., started drilling, completed well, etc.);

B. Enter description of location (well/borehole name, well being sampled, developed, tank being removed, area being cleared);

C. Enter description of equipment and materials in use and subcontractors working or on standby;

D. Note any specific activities to be completed for the day, and reference accompanying forms or attachments that need to be appended to the field note book in the order of occurrence. These might include:

- ❖ Tailgate meeting form;
- ❖ Subsurface clearance checklists;
- ❖ Equipment calibration;
- ❖ Borehole logs/well completion forms;
- ❖ Groundwater monitoring forms;

- Purge and sampling record;
- Chain-of-custody;
- Subcontractor (drillers/concrete cutters) daily reports;
- Equipment records; and,
- Supplies purchased (to be reported on expense report).

Or, for a construction/removal project:

- Air monitoring forms;
- Soil or rock tags;
- Bill-of-lading/waste manifests; and,
- Photographic log.

E. Note any variances to the project plan, project quality, or project delays;

F. Entries are to be made in ink and incorrect entries are to be changed only through strike-out, and then initialed by the note taker. Do not "scribble" or color over notes;

G. Notes must be factual, relevant and professional. No opinions or conjectures are appropriate. Observations and interpretations must be clearly distinguished within the context of the entry. Slang and editorial comments are inappropriate for field notebooks;

H. If photographs are taken, a photograph log should be maintained detailing the time the photo was taken, the name of the photographer, the direction of view in the photo, the content of the photo and any significant points to observe in photo; and,

I. Initial each page and sign and date the field notebook on the last page for each day.

3. Non-routine/significant events

A. Enter time (exact military time);

B. Record full yet concise description of any non-routine occurrence, such as an incident (i.e., spill, fire, motor vehicle accident) or other events (e.g., EPA inspection) beyond the scope of the scheduled work; and,

C. As applicable, multiple photographs should be taken to document the variance or incident.

9.0 QUALITY CONTROL CHECKS AND ACCEPTANCE CRITERIA

Quality Control Checks are required at the following points during the field notebook documentation process:

1. Prior to entering the field, the Project Manager should ensure that field personnel have read the project quality assurance documents and that these are available for reference in the field;

2. At the end of each field day, personnel are responsible to forward copies of field notebook pages and supporting documentation to the Project Manager or designee;

3. At the completion of the phase of work and/or the end of the project, field notebooks must be assembled in the home office project file;

4. Working copies of filed notebooks should be used within the home office rather than the original notebooks; and,

5. Use referenced Stantec forms, as attachments, described in Article 10.0, Documentation.

10.0 DOCUMENTATION

The following information (referenced in the field notebook), drawings and/or forms, as applicable, should be provided via facsimile to the Project Manager daily (at a minimum) unless otherwise specified by the Project Manager:

- Photographs (i.e., color thumbnail digital photos).
- Equipment records.
- Revised maps and survey notes:
  - Corrections to existing site features (add new features; remove obsolete features), as applicable.
  - Placement of new wells/borings (with measured distances).
  - Preliminary ground water elevation contour map based on new data.
- Subsurface clearance checklist from HASP.
- HASP acknowledgement form, updated as needed.
- Chain-of-custody record.
- Variance/delay form (GEO-302).
- Waste management form (GEO-303).
- Borehole logs and well completion diagrams (GEO-304).
- Purging, monitoring, sampling, and development records (GEO-305).

The following documentation list is provided for use with this field note documentation SOP:

- Field Report GEO-301.
- Variance/Time Delay Form GEO-302.

- Waste Management Form GEO-303.
- Borehole log and well construction detail template GEO-304.
- Field Note Checklist GEO-601.
- Field Supplies Checklist GEO-602.

ACCEPTANCE

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Author/Originator

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Peer Reviewer

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Senior Reviewer

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Environment Practice QA/QC Manager

Stantec	**Field Report**	**ERPA-301**
		Page 1 of 1
		Rev. 1 / Apr 2011

PC & OFFICE	DATE	PAGE	CLIENT
	PROJECT NO.	TASK NO.	SUBCONTRACTOR
TO:	LOCATION		
	WEATHER		TEMP.

CHRONOLOGY OF FIELD ACTIVITIES/ISSUES/OBSERVATIONS

EQUIPMENT USED:	SUBCONTRACTOR HOURS:	STAFF HOURS:
MILEAGE:	REVIEWED BY:	
cc:	PREPARED BY:	

Stantec	Variance / Time Delay Form	ERPA-302	
		Page 1 of 1	
		Rev. 1.1	Apr 2011

Site Name ______________________________

Location ______________________________

Stantec Project No. ______________________

The purpose of this form is to document variances from the Work Plan scope or design specifications and/or document instances of time delays. Fax or deliver to the Stantec project office with the daily report. Please print legibly.

Variance / Time Delay Began	Variance / Time Delay Ended	Duration of Variance / Time Delay
________________ Date & Time	________________ Date & Time	________________

Description of Variance

Work Plan Task / Spec Section __________

Reason for Delay AND/OR Variance

Stantec Personnel ______________________________
Print

Signature ______________________________ **Date** ________________

Stantec	# Waste Management Form	ERPA-303 Page 1 of 1 Rev. 1 Apr 2011

Project Name ______________________ **Project Manager** ______________________

Site Location ______________________ **Project Number** ______________________

Date of Generation	Manifest/ Container No.	Waste Type	Type of Waste Container	No. of Containers	Volume of Waste	Company Responsible for Transportation	Date of Off-Site Transpor-tation	Disposal Facility	Waste Characterization Submitted To	Date of Submittal	Date of Disposal

At the end of a field work day, the field notebook should contain a detailed record of events, activities, developments, and personnel involved in the site work in the form of signed and dated entries as a legal record. As such, it must be complete and in sufficient detail that, if necessary, a person not at the site could reconstruct the day's events. Information that should be entered in the field notebook each day includes, as applicable:

- Date, including year.
- Project name, number, and location.
- Purpose of visit.
- A list of Stantec, client, agency, and subcontractor personnel on site.
- Relevant weather conditions (especially significant precipitation events, temperature, wind speed and wind direction) and significant changes throughout the day.
- Times during the day recorded in military time to mark events or significant milestones.
- Any unusual circumstances, observations, or occurrences.
- Communications with client or agencies, property owners, or managers.
- Subcontractor progress and/or problems and results of subcontractor inspections.
- Notes regarding any changes to or deviations from the FSP, QAPP, or HASP, with the rationale for changes.
- Observations such as species identifications or evidence of biological stress,
- Sampling or monitoring instruments used and all equipment calibrations.
- Results of measurements, such as sampler flow rate checks, VOCs, DO, temperature, pH, animal, or plant counts, etc. Record all non-detected values using the "less than" symbol and detection limit (*e*.g., <10 ppmv). Record all units of measure clearly.
- Equipment repairs or maintenance.
- Time of occurrence and nature of any equipment or mechanical malfunctions.
- A list of samples collected, noting sample number, sampling depths, analyses to be conducted, shipping date, time, and destination.
- Identification of quality assurance samples (blanks, duplicates, replicates, etc.).
- Chain-of-custody form numbers associated with each batch of samples shipped.
- Calculations (e.g., determination of monitoring well volumes, or ichthyoplankton net depth and sample volume).
- List of all photographs taken, giving a description of the subject matter, orientation of view, time, photographer's name, and image number.
- Initial each page and sign and date the field notebook on the last page for each day.
- "X" out any unused space on each page of the notebook.
- Strike out and initial any changes to the field notes.

Stantec	**Field Supplies Checklist**	**ERPA-602** Page 1 of 1 Rev. 1.0 Apr 2011

PLANNING MATERIALS		**DISPOSABLE SUPPLIES**		**SAMPLING EQUIPMENT**	
	Proposal/work plan		Paper towels		Peristaltic pump
	Existing report data		Aluminum foil		Flexible tubing
	Cross-sections		Spray paint		Tubing
	Site plan		Trash bags		Flow-through cell
	Phone list		Non-phosphate detergent		1-inch bailers
	Access agreement		Distilled water		2-inch bailers
	ROW permit		Cleaning brushes		4-inch bailers
	Shipping airbills		Funnel		Stainless steel bailer
			Ziploc® bags		Cotton string
NOTE-TAKING SUPPLIES			Duct tape		5-gallon buckets
	Field notebook OR Field Report		Stakes		Purge trailer
	Aluminum clipboard		Flagging		Sample vials
	Borehole logs/well diagrams		Cooler		Sample bottles
	Munsell color chart		Ice and/or blue ice		Sample jars
	Surveying forms		Table/chair		Air sampling tubes
	Sampling data forms		Sample tube cutter		Metals filters
	O&M data forms		Socket set		Water/gasoline paste
	Permanent markers		Pipe wrenches		
	Pencils		Screw drivers	**LABELS**	
	Ruler		Knife		COCs
	Camera/film/digital storage		Electrical tape		COC seals
	Camera charger/batteries		Stainless trowel		Sample labels
	Protractor		100-foot surveyor's tape		Drum waste labels
	Calculator		Measuring wheel		Sample labels
			25-foot steel measuring tape		Drum waste labels
HEALTH & SAFETY SUPPLIES			Rock hammer		
	Health & Safety certifications		Sledge hammer	**SPECIALIZED EQUIPMENT**	
	HASP		Pry Bar		Laptop
	PPE card		Shovel		Data logger/transducer
	NIOSH Pocket Guide		Hand auger		Air compressor
	Hard hat		Post hole digger		Air pump
	Steel-toed boots		Broom		Pipe fittings
	Safety glasses		Snow shovel		Knockout drum
	Water resistant boots		Flashlight		Hoses
	Reflective vest		Hand mirror		Concrete mix
	Insulated coveralls				Blower
	Rain suit	**METERS**			Generator
	Respirator and canisters		Water level meter		Drill & bits
	Work gloves		Interface probe		Car battery
	Nitrile gloves		DO meter		Metal detector
	Latex gloves		Eh meter		Auto level, tripod & rod
	Viton gloves		pH meter		Slug
	Tyvek suits		Conductivity meter		
	Saranex suits		PID or FID		
	Boot covers		Draeger pump & tubes		
	Vehicle safety light		O_2/CO_2 Meter		
	Barricades		Calibration solutions		
	Traffic cones		HACH kits		
	First aid kit/eyewash kit		Electrical multimeter		
	Face shield		Pitot tube kit		
			Anemometer		
			Magnehelic gauges		
			Flow meter		
			Cathodic protection meter		

ATTACHMENT B

Crimson Pipeline LP
Dominquez SPILL
SAMPLING FIELD DATA SHEET

Date of Sampling:
Arrival Time
Departure Time:

	Sample Type (Reg/Dup/ Trip/Equip)	Sample ID (ZV-XXY-ABB-CC)	Sample Location	Time (24:00)	Latitude	Longitude	Sample Type: Water/Soil/ Sediment (W/S/M)	Sample Type: Composite/Grab (C/G)	Sample Preservation (HCL/None)	Sample Equipment Type	Field Reading (ppmv)	Depth of Sample (bgs)	Comment
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													

KEY: **Z = Activity Phase**	**X = General Location**	DC = Dominguez Channel	**Y = Media**	**A =Sample Point Type**	**BB = Boring Number**	**CC = Sample Depth**
N = Investigation Phase	FD = French Drain		W = Water	T = Transect		
C =Confirmation Phase	SL = Shell Lube		S = Soil	H = Hand Auger		
V or R= Duplicate, Otherwise left blank	YL = Youngstown Lateral	CB = Temp. TB = Trip EB = Equipment Blank	M = Sediment	G = Grab		

Notes:

GPS ID Number:	PID Serial Number:
Personnel on Site:	Field Instrument Calibration completed by
Signature:	Calibration Gas Type: 100 PPMV Isobutylene Pass / Fail

ATTACHMENT C

Irvine
17461 Derian Ave
Suite 100
Irvine, CA 92614
phone 949.261.1022 fax 949.260.3299

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	**Project Manager:**	**Site Contact:**	**Date:**	COC No:
Stantec Consulting Corp.	**Tel/Fax:**	**Lab Contact:**	**Carrier:**	_______ of ______ COCs
25864-F Business Center Dr.	**Analysis Turnaround Time**			Job No.
Redlands, CA 92374	Calendar (C) or Work Days (W) __________			
(909) 335-6166 Phone	TAT if different from Below _________			
(909) 335-6120 FAX	☐ 2 weeks			SDG No.
Project Name: Crimson Pipeline LP	☐ 1 week			
Site: Dominguez Channel	☐ 2 days			
P O #	☐ 1 day			

Sample Identification	**Sample Date**	**Sample Time**	**Sample Type**	**Matrix**	**# of Cont.**	**Filtered Sample**																		Sample Specific Notes:

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other ____________

Possible Hazard Identification

☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For __________ Months*

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time: